HONORABLE JAMES L. ROBART

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

MICROSOFT CORPORATION, Plaintiff, v. MOTOROLA INC., et al., Defendant.	No. C10-1823-JLR **REDACTED** MICROSOFT'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW
MOTOROLA MOBILITY, LLC, et al., Plaintiffs, v. MICROSOFT CORPORATION, Defendant.	

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Plaintiff Microsoft Corporation ("Microsoft") respectfully submits the following proposed findings of fact and conclusions of law. Microsoft reserves the right to propose additional or different finding of fact and conclusions of law based upon the issues addressed and evidence admitted at trial. To the extent that anything categorized as a finding of fact is more properly categorized as a conclusion of law, or vice versa, they should be so deemed.

FINDINGS OF FACT

I. THE PARTIES

1. Microsoft is a Washington corporation having its principal place of business in Redmond, Washington.

2. Motorola, Inc. has changed its corporate name to Motorola Solutions, Inc. ("Motorola Solutions"). Motorola Solutions is a Delaware corporation with its principal place of business in Schaumberg, Illinois.

3. Symbol Technologies, Inc. ("Symbol") is a wholly-owned subsidiary of Motorola Solutions.

4. Motorola Mobility LLC ("Motorola Mobility") is a Delaware limited liability company, having its principal place of business in Libertyville, Illinois. Motorola Mobility's predecessor-in-interest was Motorola Mobility Inc. ("MMI"), which was a Delaware corporation also having its principal place of business in Libertyville, Illinois.

5. MMI was a wholly-owned subsidiary of Motorola, Inc. until it was spun-off from Motorola, Inc. on January 4, 2011. MMI was acquired by Google, Inc. ("Google") on May 22, 2012. Motorola Mobility is MMI's successor-in-interest and a wholly-owned subsidiary of Google.

6. General Instrument Corporation ("General Instrument") is a Delaware corporation, having its principal place of business in Horsham, Pennsylvania. General

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Instrument was a wholly-owned subsidiary of MMI and now is a direct wholly-owned subsidiary of Motorola Mobility and an indirect wholly-owned subsidiary of Google.

7. Motorola, Inc., Motorola Solutions, Symbol, MMI, Motorola Mobility, and General Instrument are collectively referred to herein as "Motorola."

II. STANDARDS & STANDARD SETTING ORGANIZATIONS

A. The Benefits of Standards

8. Information and communication technology products frequently rely on technical standards to facilitate interoperability between complex, interconnected components. These standards have played an increasingly important role in the development, adoption, and commercialization of new technology products. Trial Tr. __.

9. Shared compatibility standards permit independently designed products to work together well. This produces a wide range of benefits: users can communicate, firms can specialize, barriers to entry are reduced, and enhanced competition works to lower prices and promote innovation. Trial Tr. __ .

10. Products like the Xbox 360 gaming console or a modern PC are created from a large number of component parts; standards are the "glue" that holds these systems together.

11. Widespread adoption of interoperability standards promotes entry by allowing even smaller firms to specialize in specific components or subsystems while still achieving economies of scale. Trial Tr. __ .

12. Specialization in component markets, in turn, benefits consumers by leading to increased competition based on price or innovation on top of the standards. Trial Tr. __ .

13. Standards also allow users and firms to enjoy the benefits of a larger installed base of complementary goods. For example, firms like Marvell Semiconductor design and sell IEEE 802.11 chipsets that will communicate with any 802.11-compliant wireless router, regardless of whether that router was designed by Cisco, NetGear, or Belkin. The chipsets are

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used in laptops, tablet computers, and smartphones because consumers value the ability to connect with a large installed base of routers. And router producers build 802.11-compliant devices because the installed base of laptops, tablets, and smartphones represents a large market opportunity. In economics, this positive feedback among diverse users of a shared standard or platform is called a "network effect." Trial Tr. __ .

B. Standard Setting Organizations

14. Standard setting organizations ("SSOs") have been established as both private and quasi-governmental organizations to develop, promulgate and promote standards. The process used to develop standards is inherently multilateral because the decision to select a particular technology in a standard is based on the consensus of the active participants. Trial Tr. __ ; PX1032.

15. Given the importance of network effects and interoperability, the benefits of standardization often flow from many participants agreeing to make a single choice, rather than the merits of the specific technology chosen. Trial Tr. __ .

16. From the perspective of a contributing participant in the standard-setting process, there are significant potential benefits to having its technology incorporated into a standard that are independent of potential royalty income from licensing patents it might have covering its technology. These benefits can include increased demand for its products, reputational benefits, and advantages flowing from familiarity with the contributed technology leading potentially to shorter development lead times and improved compatibility with proprietary complements. Trial Tr. __.

17. Examples of SSOs are the Institute of Electrical and Electronics Engineers ("IEEE"), the International Telecommunications Union ("ITU"), the International Organization for Standardization ("ISO"), and the International Electrotechnical Commission ("IEC"). Trial Tr. __.

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18. The IEEE is a not-for-profit professional organization whose activities include administering and oversight of standards development under the auspices of the IEEE Standards Association ("IEEE-SA"). Trial Tr. __; PX1078.

19. Within the IEEE, the LAN/MAN Standards Committee coordinates several Working Groups that develop networking protocols, including 802.11 Wireless Local Area Networking ("WLAN") protocol. Trial Tr.__.

20. The ITU, ISO, and IEC are global SSOs headquartered in Geneva, Switzerland. The ITU Telecommunications Standardization Sector ("ITU-T") is an agency of the United Nations. ISO and IEC collaborate on information technology standards through a group called the Joint Technical Committee 1 ("JTC1"). Trial Tr. __ .

21. The H.264 standard, also known as Advanced Video Coding ("AVC"), was developed by engineers from ITU-T's Video Coding Experts Group ("VCEG") and the ISO/IEC JTC1 Motion Picture Experts Group ("MPEG"). Trial Tr. __ .

C. The Risks of "Hold Up" & Royalty Stacking

22. Prior to the final adoption of a standard, firms are free to propose amendments or alternative technologies, making it relatively simple for SSO participants to collectively switch from a standard based on one patented technology to another patented or unpatented alternative. This threat of switching creates pre-adoption (also called "*ex ante*") competition among technologies and effectively caps the amount that a patent holder may realistically demand that SSO participants pay for a given patented technology at the incremental economic value of that technology for use in the standard as compared to its next best alternative. Trial Tr. __ ; PX1042 at 194; PX1036.

23. After the standard setting process is complete and adoption has occurred, however, holders of patents that are incorporated into the standard ("standard essential patents" or "SEPs") could, if not restrained by the commitments to the SSOs, charge an effective price

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above this *ex ante* cap because switching to an alternative is either infeasible or costly at that point. This is particularly true where the patent holder is dealing with a single implementer that cannot unilaterally alter the requirements of the standard set by the SSO. Trial Tr. __.

24. Thus, while the adoption of a standard can enhance efficiency, it eliminates competitive alternatives thereby creating a form of market power. Absent enforceable obligations to do otherwise, holders of SEPs gain the ability to "hold up" implementers by demanding higher royalties than they would be able to demand prior to inclusion in the standard when there was competition for the design of the standard. Trial Tr. __.

25. The risk of "hold up" in the standards context increases as industry participants make investments to implement the standard and as the standard becomes more widely adopted. Trial Tr. __.

26. Once a standard is widely deployed, essential patent holders have an extremely strong bargaining position. Any individual firm that attempts to switch to an alternative technology would lose not only its own prior investments in its standards-compliant implementations, but also the inter-operability benefits associated with the standard's large installed based, which often includes the firm's own customers. Given this bargaining advantage, holders of SEPs have little or no market incentive to offer concessions in such post-adoption (i.e., "*ex post*") negotiations. Trial Tr. __.

27. Complex industry standards can implicate hundreds or thousands of SEPs and patent holders. Trial Tr. __ .

28. High tech products can implicate dozens or even hundreds of different standards. For example, a recent study found that a typical modern laptop computer implements 90 standards developed by formal SSOs and 112 standards developed by industry consortia like the World Wide Web Consortium, Bluetooth Special Interest Group ("SIG") or Video Eletronics Standards Association. Trial Tr. __ ; PX1024.

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29. In the context of standards that implicate many SEPs, and products that implicate many standards, the risk of the use of post-adoption leverage to exact excessive royalties is thus compounded by the sheer number of licensors, which can result in stacking of cumulative royalties to levels that are unsustainable and destructive to the benefits of the standards. Trial Tr. __ ; PX1038.

30. Economic theory suggests that royalty stacking is a consequence of decentralized pricing of complementary monopoly inputs such as SEPs. In such cases, essential patent holders could all increase their profitability by collectively lowering prices: their lower margins would be more than offset by increased volume. But, even if all patent holders recognize that the cumulative price is too high, each individual licensor would rather maintain its price and let all of the other patent holders cut their prices leading to suboptimal results for all. Trial Tr. __; PX1019 at pp. 122-24.

D. SSO Intellectual Property Policies

31. In order to address concerns of hold up, royalty stacking, and other practices that would undermine widespread implementation of their standards, most SSOs have adopted intellectual property ("IP") policies that define the obligations of participants to disclose relevant patents or pending applications during the standard setting process and to commit to license such patents on reasonable and non-discriminatory ("RAND") terms and conditions if they are essential to the standard. Trial Tr. __ .

32. The Federal Trade Commission has stated that "[t]he most common mechanism used by SSOs to attempt to prevent patent hold-up is the RAND commitment." PX1441 at p. 28037.

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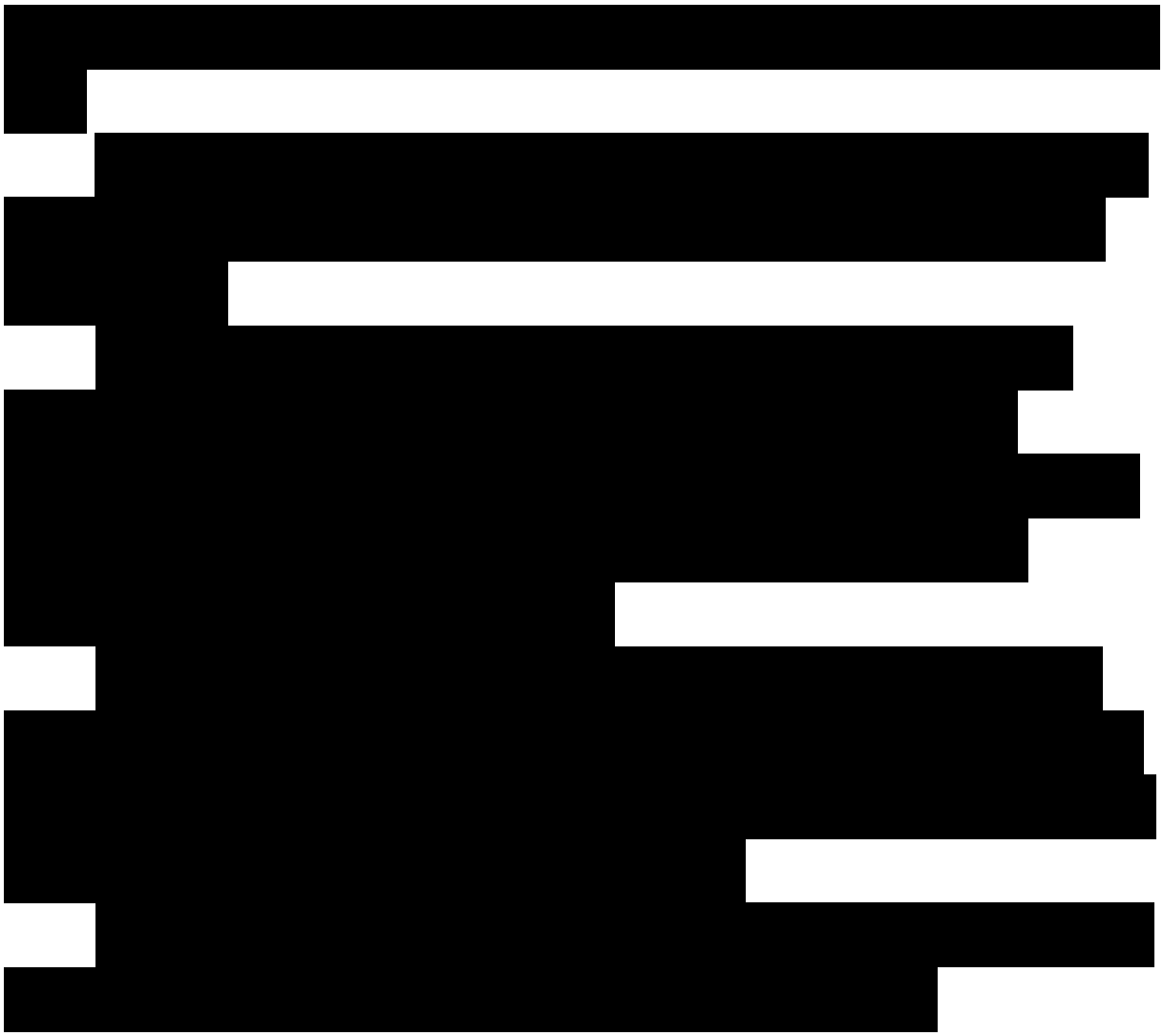

1. .The IEEE IP Policy

38. The IEEE patent policy provides that IEEE standards may include "Essential Patent Claims," which it defines as "any Patent Claim the use of which was necessary to create a compliant implementation of either mandatory or optional portions of the normative clauses of the [Proposed] IEEE Standard when, at the time of the [Proposed] IEEE Standard's approval, there was no commercially and technically non-infringing alternative." PX1597 at § 6.1.

39. The IEEE Standards Board Operations Manual indicates that there should be a "call for patents" at every meeting of an IEEE Working Group, and that "if any individual

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believes that Patent Claims might be Essential Patent Claims, that fact should be made known to the entire working group and duly recorded in the minutes of the working group meeting." PX1089 at p. 35.

40. If an IEEE Working Group identifies a patent that may be essential, it must seek assurance that the owner will either not assert the patent or will grant a license to implementers on RAND terms and conditions. Specifically, the policy indicates that "[i]f the IEEE receives notice that a [Proposed] IEEE Standard may require the use of a potential Essential Patent Claim, the IEEE shall request licensing assurance, on the IEEE Standards Board approved Letter of Assurance form, from the patent holder or patent applicant." PX1597 at § 6.2.

41. The IEEE Letter of Assurance form allows declared essential patent holders to provide "[a] general disclaimer to the effect that the Submitter without conditions will not enforce any present or future Essential Patent Claims" or "[a] statement that a license for a compliant implementation of the standard will be made available to an unrestricted number of applicants on a worldwide basis without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination." PX1597 at § 6.2.

42. The IEEE Letter of Assurance form allows, but does not require, the disclosure of specific patents or pending patent applications. A Letter of Assurance that commits to license unspecified patents or pending applications for a particular standard is called a "blanket" disclosure. Trial Tr. __ .

43. IEEE policies and guidelines on declaring explicit RAND terms and conditions have changed over time. During the initial stages of the development of the 802.11 standard when Motorola and Symbol submitted their first blanket Letters of Assurance, the IEEE patent policy indicated that patent holders should provide "a draft of their license that assures that the

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technology will be made available at nominal competitive costs to all who seek to use it for compliance with an incorporated IEEE standard." PX1144.

44. The language regarding explicit advanced disclosure of proposed terms was removed by 1996. PX1672; PX1584.

45. The IEEE's current patent policy was adopted in 2007, and indicates that "at its sole option, the Submitter may provide with its assurance any of the following: (i) a not-to-exceed license fee or rate commitment, (ii) a sample license agreement, or (iii) one or more material licensing terms." PX1597 at § 6.2.

46. Motorola Solutions, Motorola Mobility, Symbol Technologies, and their predecessors submitted numerous Letters of Assurance to the IEEE in relation to the 802.11 standard. PX3, PX23, PX24, PX25, PX26, PX27, PX 28, PX29, PX30, PX31, PX 32, PX1145, PX1146, PX1147, PX1148, PX1149; PX1263; PX1605. While the language of these letters differs somewhat, they each contain a RAND licensing commitment.

2. The ISO/IEC/ITU Common Patent Policy

47. ITU, ISO and IEC maintain a common patent policy. The "sole objective" of the policy is to ensure that "a patent embodied fully or partly in a Recommendation | Deliverable must be accessible to everybody without undue constraints." PX115.

48. The ITU/ISO/IEC Common Patent Policy and Implementation Guidelines encourage disclosure of potentially essential patents "as early as possible" in the standards development process. PX115.

49. Once a potentially essential patent has been disclosed or if a patent holder makes a blanket disclosure, the ITU will seek a licensing commitment from the patent-holder using a standardized IPR disclosure form. This form provides three options to the patent holder: (1) the patent holder may commit to license its essential patent(s) on a royalty-free

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basis; (2) the patent holder may commit to license its essential patent(s) on RAND terms and conditions; or (3) the patent holder may decline to make any licensing commitment. PX115.

50. A patent holder willing to make a licensing commitment is given the option of making its commitment conditional on "reciprocity." PX115.

51. Under the ISO/IEC/ITU policy, when a patent holder has conditioned its licensing commitment on reciprocity, "the Patent Holder shall only be required to license any prospective licensee if such prospective licensee will commit to license its essential patent(s) or essential patent claim(s) for implementation of the same above document free of charge or under reasonable terms and conditions." PX115.

52. If the owner of a declared essential patent declines to make a RAND or royalty-free licensing commitment, the standard must be amended to avoid the relevant patent claims. Specifically, the ISO/IEC/ITU policy indicates that the approved standard "shall not include provisions depending on the patent." PX115.

53. Motorola Mobility, its predecessors, and its wholly-owned subsidiary General Instrument submitted several intellectual property disclosures to the ITU in connection with the development of the H.264 standard. PX0004; PX1150; PX1151; PX1152; PX1264. Some of these intellectual property disclosures listed specific patents or pending applications, and others were blanket disclosures. All of Motorola's disclosures indicated that, in effect, it would "grant to an unrestricted number of applicants on a worldwide, non-discriminatory basis and on reasonable terms and conditions" licenses conditioned on reciprocity.

III. PATENT POOLS & COLLECTIVE LICENSING AGREEMENTS

54. Owners of SEPs sometimes use patent pools or other collective licensing agreements such as Special Interest Groups and Sponsor Organizations to license their intellectual property in a collective fashion. Trial Tr. __.

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55. Patent pools serve as a "one-stop shop" that allow parties interested in a technology to gather many (or all) of the patents necessary to implement the technology in one place rather than obtaining patent licenses from each patent holder individually. Licensees pay royalties to the pools rather than the individual licensors. Pools typically apportion those royalties to licensors based on each licensor's proportionate share of SEPs in the pool. Trial Tr. __.

56. The U.S. Department of Justice and Federal Trade Commission Antitrust Guidelines for the Licensing of Intellectual Property state that patent pools "may provide competitive benefits by integrating complementary technologies, reducing transaction costs, clearing blocking positions, and avoiding costly infringement litigation." Trial Tr. __ ; PX1040 at § 5.5.

57. Prominent modern patent pool administrators include MPEG LA, the administrator of pools for the MPEG-2, H.264, IEEE 1394 (Firewire), and MPEG-4 Visual standards; Via Licensing, which licenses SEPs for the 802.11 standard among others; and Sisvel, which licenses patents for several standards including UHF-RFID, CDMA2000, and MPEG Audio. Trial Tr. __ ; PX1186 (summarizing 26 collective licensing arrangements for SEPs).

58. [redacted]

A. The MPEG LA H.264 Pool

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59. Formed in June 2004, the MPEG LA H.264 pool contains 275 U.S. standard-essential patents and over 2400 standard-essential patents worldwide. Those standard-essential patents have been contributed by twenty-six licensors including leading technology firms such as Apple, Cisco, Sony, Microsoft, Hewlett-Packard, and Siemens AG. Trial Tr. __ ; PX1168.

60. Among the licensors in the MPEG LA H.264 pool are firms that derive all or a substantial majority of their relevant revenue from licensing activities, including Dolby Laboratories, the Electronics and Telecommunications Research Institute ("ETRI"), Fraunhofer-Gesellschaft zur Foerderung der angewandten Forschung e.W., Sedna Patent Services LLC, and the Trustees of Columbia University. Trial Tr. __ .

61. There are over 1100 licensees of the MPEG LA H.264 patent pool, including Google, Fujitsu, LG Electronics, NetGear, and Samsung. PX1455.

62. [redacted]

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[redacted]

68. [redacted]

69. The H.264 standard faced competition from other standards when it was adopted. In the absence of the H.264 royalty structure adopted by MPEG LA that was compatible with Microsoft's business model, Microsoft would not have supported the MPEG LA H.264 patent pool and would have actively pursued, and encouraged others to pursue, alternative video compression technologies. Trial Tr. __.

B. The Via Licensing 802.11 Patent Pool

70. Via Licensing Corporation, a wholly-owned subsidiary of Dolby Laboratories, formed a pool of patents essential to the 802.11 standard in 2005. The pool currently includes six licensors and 38 patents essential to the 802.11 standard. Trial Tr. __ ; PX1173.

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71. Licensors of the Via 802.11 pool include ETRI, France Telecom RD/PIV, Japan Radio Co., Ltd., Koninklijke Philips Electronics N.V., LG Electronics, Inc., and Nippon Telegraph and Telephone Corporation. PX1173.

[redacted]

75. The 802.11 licensing pool has rates that vary from $0.55 to $0.05 per unit depending on the volume pursuant to the following schedule:

Units/Year	License Fee Per Unit
1 to 500,000	$0.55
500,001 to 1,000,000	$0.50
1,000,001 to 5,000,000	$0.45
5,000,001 to 10,000,000	$0.30
10,000,001 to 20,000,000	$0.20
20,000,001 to 40,000,000	$0.10
40,000,001 or more	$0.05

Trial Tr. __ ; PX1188.

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77. As in the case of the MPEG LA H.264 pool, participating licensors receive a share of the royalties collected by the pool based upon their relative patent contributions, which is a function of the number of patents contributed to the pool relative to the total as well as the country in which the patent was granted. Trial Tr. __ .

IV. ECONOMIC GUIDEPOSTS FOR ASSESSING RAND TERMS

78. From an economic perspective, a RAND commitment limits a patent holder to a reasonable royalty on the economic value of its patented technology itself and apart from the value associated with monopoly power derived from adoption of the standard. Trial Tr. __ ; PX1055; PX1042 at p. 194.

79. In the event of a dispute concerning whether or not a given royalty is RAND, a proper methodology used to determine a RAND royalty should recognize and seek to mitigate the risk of patent hold up that RAND commitments are supposed to avoid. Trial Tr. __ .

80. Likewise, a proper methodology for determining a RAND royalty should recognize and assess whether a proposed royalty is reasonable given the contextual risk of royalty stacking. Trial Tr. __ .

81. Assessing proposed RAND license terms from an *ex ante* multilateral perspective assists in addressing both of these concerns. Trial Tr. __ .

A. An *Ex Ante* Approach Addresses the Risk of Patent Hold Up

82. Considering the situation *ex ante* – that is, with a view of the situation either before the standard had been set or before there had been large scale investment in its implementation – ensures that a licensor will be unable to capture hold-up value or switching costs, and would therefore receive no more than the incremental value of its proprietary technology compared to alternatives. Trial Tr. __.

83. If most of a standard's value comes from interoperability benefits that could be achieved using a variety of designs at similar cost levels, then the patented technology has little

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incremental value and the highest pre-adoption or *ex ante* price will be relatively small. Trial Tr. __.

84. In many cases, the appropriate *ex ante* baseline price is zero, either because of the availability of an unpatented alternative technology, because the patent owner accrues substantial individual benefits from incorporation of its SEPs into the standard (even before royalties), or because the technology will be rendered obsolete if not chosen. If the *ex ante* alternative is to omit the feature or function that relies on an essential patent, the proper baseline price is always zero, since that alternative choice is obviously royalty-free. Trial Tr. __ .

85. There is a substantial consensus among economists and commentators supporting the evaluation of RAND terms from an *ex ante* perspective. Trial Tr. __ ; PX1020; PX1021.

86. Motorola's expert, Richard Schmalensee, has advocated such an approach in his academic writing. He (and his co-authors) have written: "Consistent with reasonable royalty calculations in the context of patent infringement, the models here could provide structure for a court review. The various parties could make their cases in court for the relative values of their IP contributions to the standard, in the context of other options considered during the standard's early development phases. If a component had multiple alternatives before the standard was settled, its incremental contribution, properly measured, may be close or equal to zero." PX0293 at p. 705–06.

87. After an extensive set of public hearings, the FTC issued a March 2011 report entitled "The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition." In this report, the FTC explicitly endorsed using an *ex ante* approach to assessing RAND royalties, recommending that courts "cap the royalty at the incremental value

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of the patented technology over alternatives available at the time the standard was defined." PX1042 at p. 194.

B. A Multilateral Perspective Addresses The Risk of Royalty Stacking

88. Just as an *ex ante* perspective addresses the concern of patent hold up, considering RAND terms from a multilateral perspective that accounts for the aggregate royalty burden that would be imposed if all SEP holders sought similar royalties addresses the concern with royalty stacking. Trial Tr. __.

89. Adopting a multilateral perspective means considering the aggregate royalty burden potentially imposed by all SEP holders; it does not require or imply that the actual negotiation of RAND license agreements should necessarily be conducted multilaterally. Rather, it provides a larger contextual framework for private parties to use in evaluating proposed RAND terms in bilateral negotiations or for a court to consider in evaluating proposed RAND terms in the event of a dispute. Trial Tr. __ .

C. The Selection of Appropriate Comparables

1. Collective Licensing Arrangements

90. Patent pools and related collective licensing arrangements have several features that make them useful benchmarks for establishing RAND terms and conditions. Trial Tr. __.

91. Such pools are generally focused on a single standard and include only patents that have been reviewed and deemed to be essential to that standard. Trial Tr. __ .

92. Particularly when the pool is formed at or near the time the standard is promulgated or before it is widely adopted, the terms and conditions of a collective licensing arrangement provide a real-world indication of the terms that would have been reached in a pre-adoption *ex ante* setting – i.e., before implementers have made substantial sunk cost investments. Trial Tr. __.

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93. Because of their multilateral nature, patent pools must choose an aggregate royalty rate covering many different licensors and patents. As a result, they also must confront the royalty stacking problem. Trial Tr. __ .

94. Indeed, patent pools around SEPs have emerged, in part, to address the problem of royalty stacking. Trial Tr. __ ; PX1019; PX1038; PX1044; PX1046; PX1047.

95. Because of the diversity of membership and need to attract both licensors and licensees to participate in a pool, the terms struck must reflect a balance of the interests of SEP holders and implementers alike. Trial Tr. __; PX1143 (explaining that MPEG LA balances "patent users' interest in reasonable access with patent owners' interest in reasonable return").

96. Pool rates also reflect the degree of competition between competing standards. Pools that involve standards that face stronger competition from competing standards will, all else being equal, set lower rates than those that involve standards that face less competition. Trial Tr. __.

97. Because they address the complementary monopoly problem that can give rise to royalty stacking concerns, patent pools can set lower royalties while still generating higher returns for licensors based on aggregate volume gains. Trial Tr. __.

[redacted]

2. Bilateral *Ex Post* Agreements

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99. Because SEP holders often have the power to demand royalties that reflect hold-up value and the prohibitive costs of switching to alternative technologies in such a context, post-adoption or "*ex post*" bilateral negotiations may not yield RAND royalties. Trial Tr. __ .

100. The licensor's advantage in *ex post* negotiation is amplified by the ability to bargain with individual implementers sequentially. Trial Tr. __ .

101. In addition, as the FTC has recognized, *ex post* negotiations under the threat of an injunction or exclusion order "may allow the holder of a RAND-encumberd SEP to realize royalty rates that reflect patent hold-up, rather than the value of the patent relative to alternatives, which could raise the prices to consumers while undermining the standard-setting process." Trial Tr. __; PX1043.

102. As a result, absent facts and circumstances indicating that they do not reflect hold-up value, *ex post* bilateral license agreements are, as a general matter, a less reliable benchmark than collective license arrangements for assessing RAND terms. Trial Tr. __.

V. MOTOROLA'S OCTOBER 2010 PROPOSED LICENSING TERMS

103. In a letter dated October 21, 2010 Motorola offered to grant Microsoft a worldwide, nonexclusive patent license for Motorola's portfolio of patents "that may be or become Essential Patent Claims (as defined in section 6.1 of the IEEE bylaws) for a compliant implementation of the IEEE 802.11 Standards." PX1. Motorola proposed that Microsoft pay a "royalty of 2.25% per unit for each 802.11 compliant product, subject to a grant back license under the 802.11 essential patents of Microsoft." PX1. Motorola's letter specified that this royalty was to be calculated based on the price of the "end product (e.g., each Xbox 360 product) and not on component software (e.g. Windows Mobile Software.)" PX1. The letter stated that Motorola would "leave this offer open for 20 days," and asked Microsoft to "confirm whether [it] accepts the offer." PX1.

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104. [redacted]

105. An Administrative Law Judge ("ALJ") of the International Trade Commission ("ITC") found that Microsoft's Xbox product does not infringe the '712 patent. PX0428.

106. The claims of the '712 patent have been interpreted by two U.S. district courts such that they would not be essential to the 802.11 standard. *See* § XII.B *infra*.

107. In a letter dated October 29, 2010 Motorola offered to grant Microsoft a worldwide, nonexclusive patent license for Motorola's portfolio of patents "covering the subject matter of ITU-T Recommendation H.264." PX2. Again, Motorola proposed that Microsoft pay a "royalty of 2.25% per unit for each H.264 compliant product, subject to a grant back license under the H.264 patents of Microsoft." PX2. Motorola's letter specified that this royalty was to be calculated based on "the price of the end product (e.g., each Xbox 360 product, each PC/laptop, each smartphone, etc.) and not on component software (e.g., Xbox 360 system software, Windows 7 software, Windows Phone 7 software, etc.)." PX2. The letter again stated that Motorola would "leave this offer open for 20 days," and asked Microsoft to "confirm whether [it] accepts the offer." PX1.

108. [redacted]

109. Based on the assumption that a personal computer costs $500, and publicly available estimates that approximately 352 million Windows-based personal computers were sold in 2011, Motorola's original H.264 demand amounts to almost $4 billion per year or roughly 300 times the aggregate amount all members of the MPEG LA H.264 pool would receive from Microsoft on an annual basis. Trial Tr. __; PX1067.

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110. Likewise, the royalty Motorola demanded on even the lowest priced Xbox gaming console would [redacted].

111. On November 9, 2010, Microsoft filed the present action alleging that the terms and conditions proposed by Motorola were in breach of its contractual commitments to license its 802.11 and H.264 SEPs on RAND terms and conditions. Dkt. No. 1 (Complaint).

112. An ALJ of the ITC subsequently found the terms proposed in Motorola's October 2010 letters to be so unreasonable that they "could not possibly have been accepted by Microsoft" and that "there is no evidence that any company would agree to the offer that Motorola sent to Microsoft." PX428 at 300–01.

113. Thus, the ALJ concluded that "Motorola was not interested in good faith negotiations [with Microsoft] and in extending a RAND license to it." PX428 at 303.

VI. THE ISSUES IN DISPUTE IN THIS PROCEEDING

114. At issue in this proceeding is a determination of the terms of RAND licenses to Motorola's portfolios of 802.11 and H.264 SEPs.

115. There is no dispute between the parties regarding certain features of such RAND licenses. The licenses would be non-exclusive and worldwide in scope in keeping with the nature and scope of Motorola's RAND commitments and the terms proposed in its initial October 2010 letters. Trial Tr. __.

116. Although [redacted] and with Motorola's RAND commitments because it would create another opportunity for hold up. Instead, the agreement would be irrevocable and remain in force for the life of Motorola's SEPs. Trial Tr. __ .

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117. The licenses would, in both cases, involve a reciprocal grant-back by Microsoft to Motorola of a license to Microsoft's H.264 and 802.11 essential patents. Trial Tr. __ .

118. Thus, the remaining issues for determination in this proceeding are the royalty terms of such licenses.

119. The central nature of the issue of core royalty terms (including the grant-back) to this dispute is confirmed by Motorola's October 2010 demand letters, which contained only those terms and sought acceptance within 20 days. PX1; PX2; Trial Tr. __ .

VII. SUMMARY OF BACKGROUND OF THE H.264 AND 802.11 STANDARDS

120. Analysis of the royalty terms of a RAND license to Motorola's (and Microsoft's) 802.11 and H.264 SEPs can benefit from an understanding the background of the relevant standards, the parties' portfolios of related SEPs, and how they are used in the parties' products.

121. That background information is summarized here and set forth in detail in the two final sections. *See* Sections XI and XII, *infra.*

122. The H.264 and 802.11 standards are large and complex collections of technologies. Many well-known techniques and technologies have been incorporated into the standards throughout their respective development. In fact, the majority of the technologies available to and/or adopted by the H.264 and 802.11 drafters were well-known and in the public domain. Trial Tr. __.

123. The drafters of these standards had a wide variety of possible technical implementations to choose from that could have been used to implement particular functionality. Trial Tr. __

124. Motorola and other companies have asserted that a number of patents are essential to either the H.264 or 802.11 standards.

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125. Motorola's patents relate to a small subset of technologies in the 802.11 standard and had little incremental value compared to other alternatives. Those technologies are a small subset of subjects covered by the 802.11 standard. Trial Tr. __.

126. Likewise, Motorola's patents relate to a small subset of technologies in the H.264 standard and had little incremental value compared to other alternatives. Those technologies are a small subset of subjects covered by the H.264 standard. Trial Tr. __.

127. From a technical standpoint, the Motorola patents have little if any value to Microsoft, both because the H.264 and 802.11 standard writers could have adopted alternatives to the Motorola patents with little impact on the performance of standard-compliant devices, and because the Motorola patents have no particular value in Microsoft's products. Trial Tr. __.

VIII. APPROPRIATE RAND ROYALTIES FOR MOTOROLA'S H.264 AND 802.11 SEPs

128. Microsoft's licensing and economics expert, Matthew Lynde, calculated RAND royalties for licenses to Motorola's H.264 and 802.11 SEPs consistent with the economic guideposts for determination of RAND royalties discussed above and the available evidence concerning the structure and level of royalties charged by the relevant patent pools and other benchmarks.

A. H.264

1. Royalties Based on the MPEG LA H.264 Patent Pool

129. For the H.264 standard, the MPEG LA H.264 patent pool is the closest real-world comparator to the ideal *ex ante* multilateral approach described above. Trial Tr. __ .

130. Given the timing of its formation (shortly after promulgation of the H.264 standard and before it had been widely adopted), as well as the number and diversity of the firms that have participated as either licensors or licensees in the pool, it provides a compelling

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real-world data-point for what a RAND royalty would look like for H.264 SEPs, including the patents that Motorola alleges to be essential in the present case. Trial Tr. __.

131. The use of the MPEG LA H.264 patent pool as a benchmark in this case is further supported by the relatively narrow focused scope of Motorola's H.264 portfolio on support for interlaced video, the limited significance of interlaced video to products like Microsoft's, and the alternatives to Motorola's patented technology that have been identified. These factors suggest that there is no basis to conclude that Motorola's H.264 portfolio is more valuable than the portfolios of the licensors in the H.264 patent pool. Trial Tr. __.

[redacted]

133. The rates and royalty structure adopted for the MPEG LA H.264 patent pool, and the resulting shares of total pool royalties received by individual licensors, are RAND. Trial Tr. __.

134. In particular, the licensing rates and caps employed by the H.264 pool can be used to estimate the effective per unit rates that Microsoft would be expected to pay per patent or in total if either (a) Motorola received royalties equivalent to what a firm with a like-sized portfolio would receive as a member of the pool or (b) Motorola received royalties equivalent to what it would have received if it and the other holders of other readily identifiable H.264 SEPs all joined the pool.

135. If Motorola received royalties equivalent to what a firm with a like-sized portfolio would receive as a member of the pool, it would receive from [redacted]. Trial Tr. __ .

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136. Motorola's payment to Microsoft for a grant-back to Microsoft's H.264 patents under the same terms would amount to approximately [redacted] Trial Tr. __ .

137. Thus, [redacted].

138. To better account for royalty stacking concerns, one can also consider the effect of adding, in addition to [redacted], the 89 other specific SEPs that have been disclosed by five companies that do not presently participate in the MPEG LA patent pool. Trial Tr. __ ; PX1169.

139. Under this full participation scenario, Motorola would receive [redacted] and Microsoft [redacted] of the pool's royalty revenues. Trial Tr. __ ; PX1176.

140. [redacted]

141. [redacted]

142. Therefore, under a full participation scenario based on the MPEG LA H.264 patent pool, [redacted]

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Royalties Based On

147.

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148. As of May 22, 2012, Motorola Mobility and General Instrument became affiliates of Google [redacted]

149. [redacted]

152. [redacted].

B. 802.11

153. There are a number of indicators supporting a RAND royalty for a license to Motorola's 802.11 SEP portfolio of approximately [redacted]. Trial Tr. __ .

1. The Via Licensing 802.11 Pool

154. Although the Via 802.11 patent pool has enjoyed less success than the MPEG LA H.264 patent pool, it provides evidence from actual multilateral negotiations as to a ceiling for RAND royalties for Motorola's 802.11 patents, although given its relatively limited participation rate appropriate adjustments are necessary to account for stacking and hold up.

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155. [redacted].

156. Via Licensing began soliciting applications in October 2003 for holders of 802.11 patents to join the discussion to determine commercialization terms for a patent pool under "fair, reasonable, and nondiscriminatory terms." PX1161.

[redacted]

159. The applicants with patents that were deemed essential then collectively determined fair, reasonable, and nondiscriminatory terms for a license to the pool of patents. A license to a pool of patents held by five companies became available on April 14, 2005. PX1160.

[redacted] At the time the pool was formed, five companies contributed a total [redacted] to the pool; [redacted]

162. Because of the relatively low level of participation in the pool, an appropriate analysis of a RAND royalty for Motorola's standard-essential patents using the Via Licensing pool requires assessing the royalties Motorola might expect to receive from Microsoft if more of the standard-essential patents related to 802.11 were in the Via Licensing pool and

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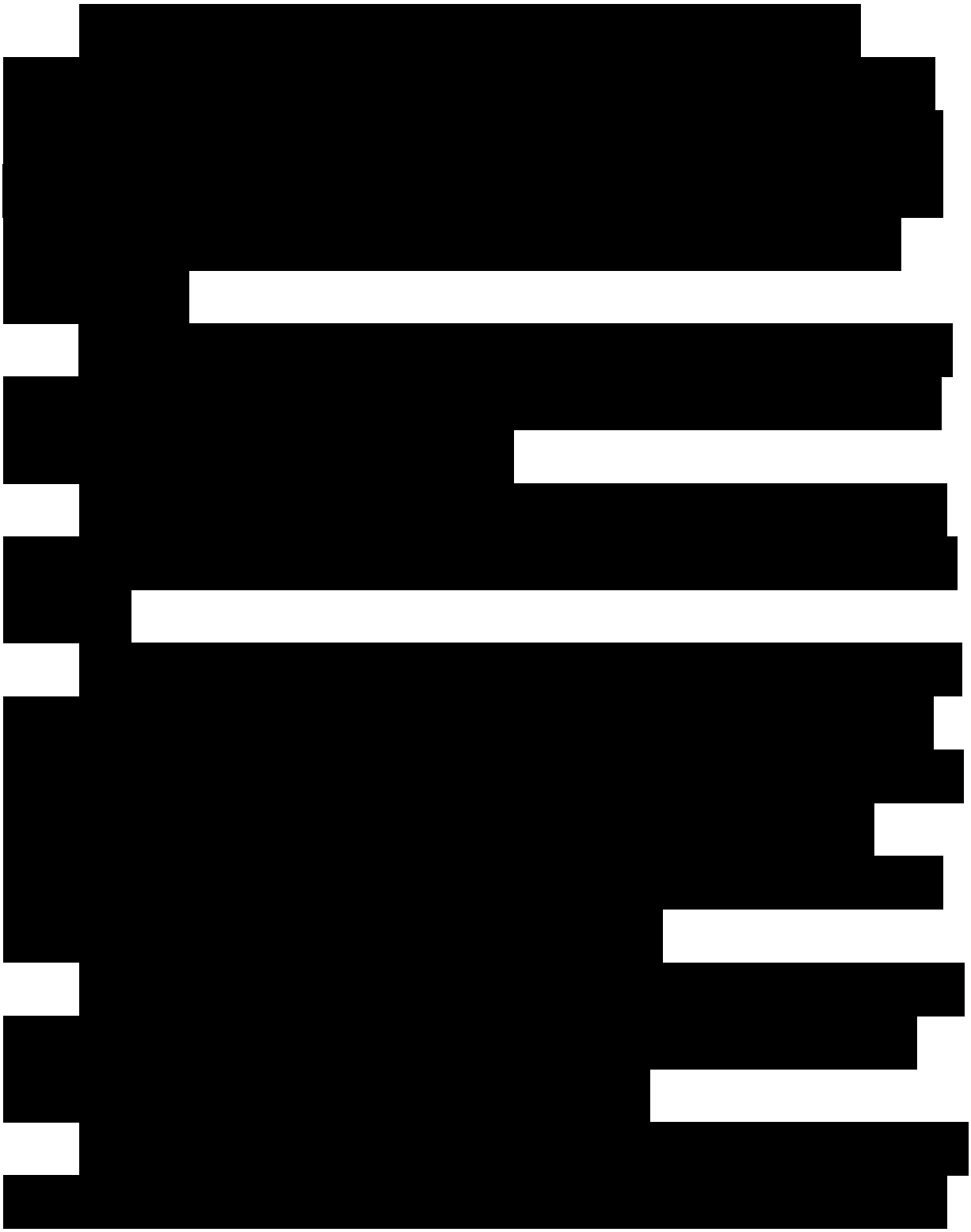
Microsoft took a license to the pool. This permits the analysis to address the potential concern with royalty stacking. Trial Tr. __ .



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[redacted]

2. Motorola's [redacted]

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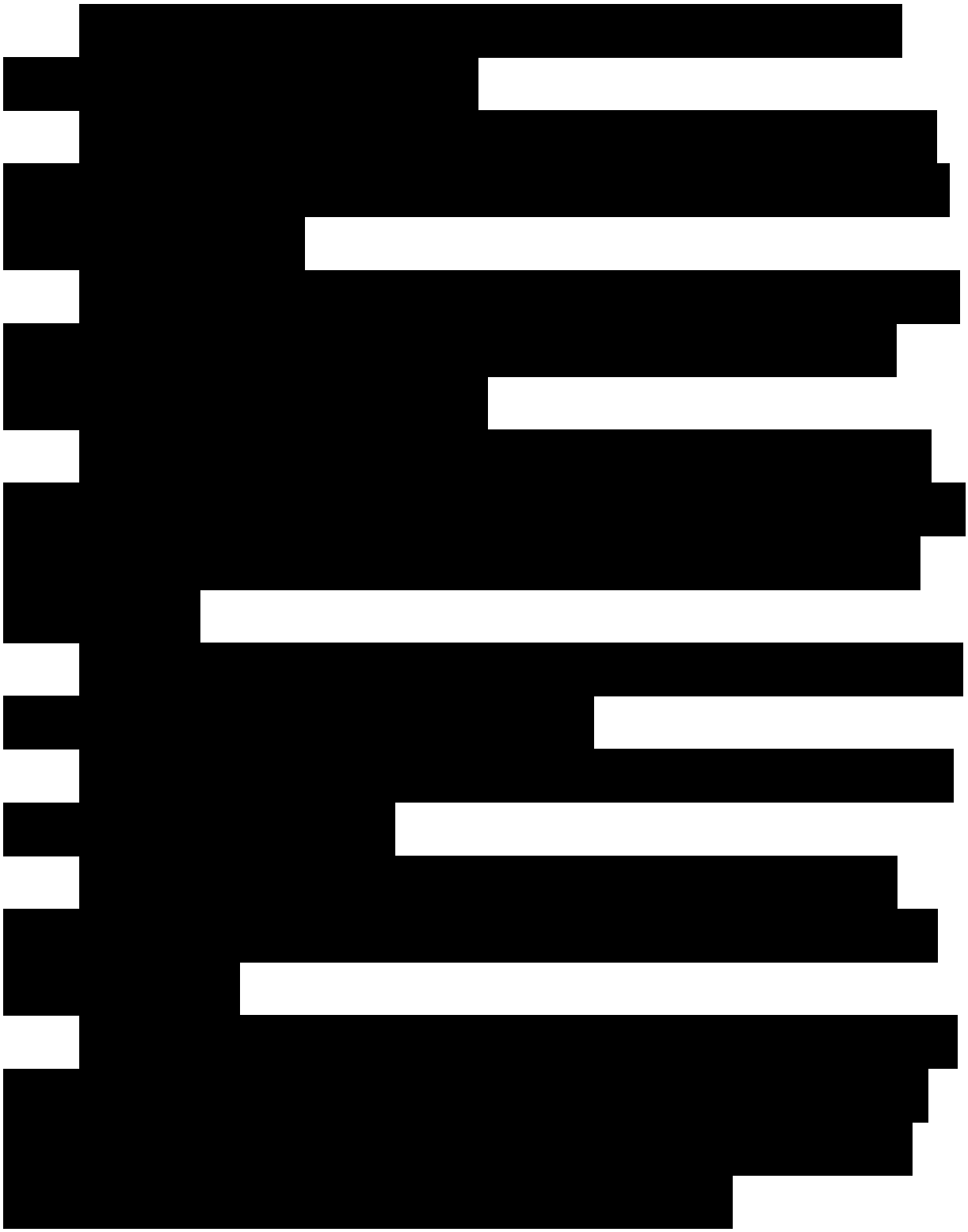

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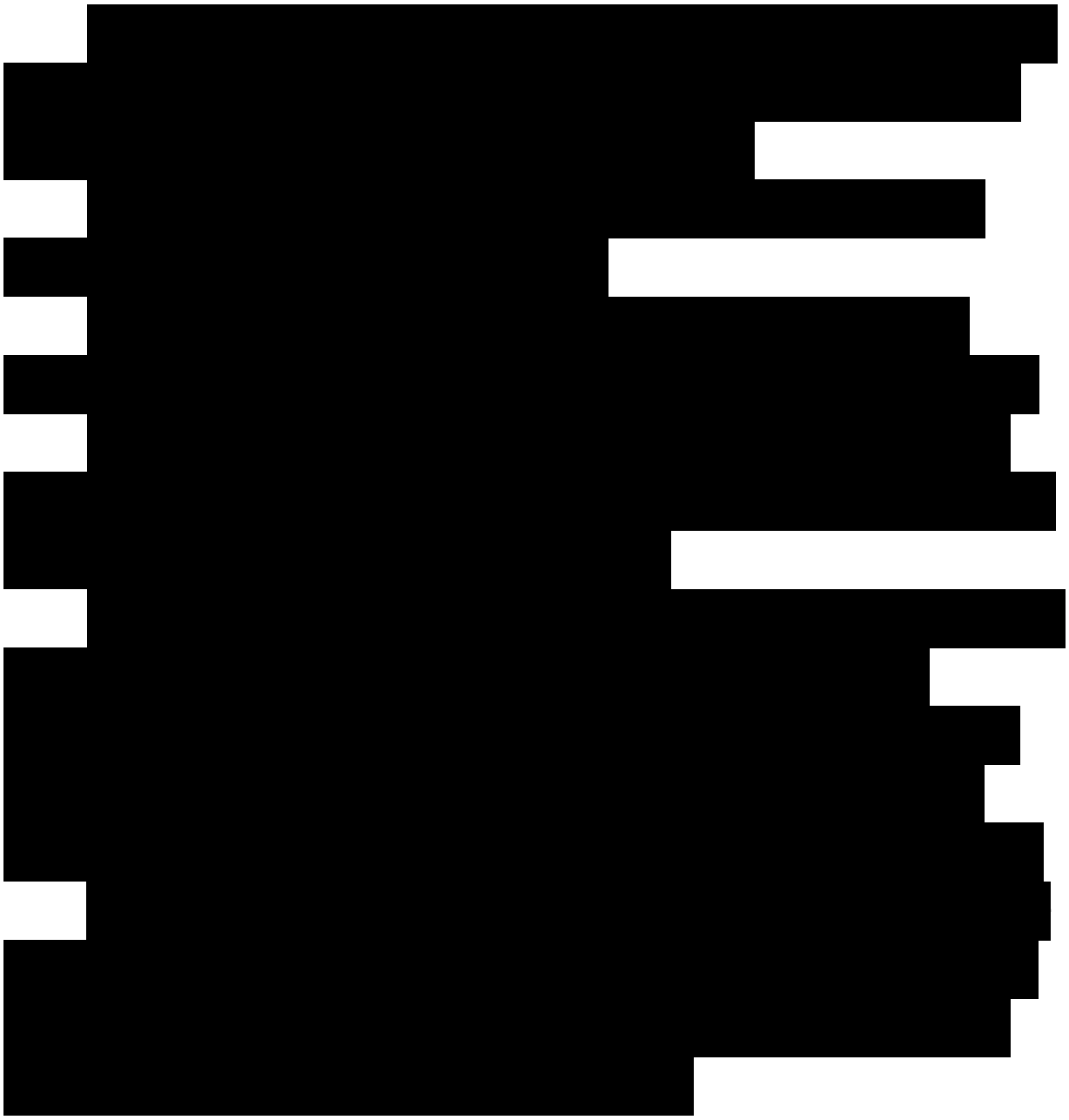

3. The Cost of The WiFi Chips That Provide 802.11 Functionality In Xbox Consoles

190. Another indication of a ceiling for a RAND royalty for Motorola's portfolio of 802.11 SEPs comes from applying Motorola's proposed royalty rate to the cost of the WiFi chip delivering 802.11 functionality. Trial Tr. __ .

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191. [redacted]

4. Licensing Rates for Fundamental Chip Technology

194. Royalties paid for truly fundamental technology that is not required to be licensed under RAND terms also provide another indication of a ceiling for a RAND royalty for Motorola's 802.11 SEPs. Trial Tr. __ .

195. ARM Holdings plc ("ARM Holdings") is a well-known supplier of foundational semiconductor intellectual property used in the manufacture of semiconductor chips, including those that provide WiFi functionality. ARM Holdings licenses its chip architecture to, among others, Marvell, the manufacturer of the WiFi chips incorporated in Xbox. Trial Tr. __.

196. In its 2011 annual report, ARM Holdings noted that total royalty revenue for 2011 was $405.6 million, which divided by the 7.9 billion microchips shipped by ARM's licensees in 2011, results in a per unit rate of $0.05. Considering all licensing revenue (total royalty revenue for 2011 plus total licensing revenue for 2011 of $285.7 million), the per unit rate was $0.09. Trial Tr. __ ; PX1207.

5. Reciprocity

197. [redacted]

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[redacted]

6. Conclusion Regarding 802.11

198. Based on analysis of the royalty levels and structure of the Via 802.11 pool, a RAND royalty for a license to Motorola's 802.11 SEP portfolio would be approximately [redacted] per unit. That a royalty of that magnitude is RAND is corroborated by comparison to other available benchmarks, including the royalty suggested by [redacted], and a comparison to the royalty rates received for fundamental and non-RAND-encumbered microchip technology.

IX. MOTOROLA'S EXPERTS' OPINIONS REGARDING RAND TERMS FOR A LICENSE TO MOTOROLA'S H.264 AND 802.11 SEPS

A. Motorola's Experts' Approach

199. Motorola's licensing expert, Charles Donohoe, sought to determine the terms of a RAND license in this case by considering the terms that would have resulted from a hypothetical negotiation between Motorola and Microsoft taking place in November 2010, just after Motorola's October 2010 letters were sent. Trial Tr. __.

200. In considering such a hypothetical negotiation, Mr. Donohoe looked to the factors set forth in *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970), that have frequently been used in the determination of reasonable royalty damages for patent infringement. Trial Tr. __.

201. [redacted]

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202. In Dr. Schmalenesee's academic writing, he (and his co-authors) previously expressed the view that economic models that apply an *ex ante* approach to avoid rewarding the patent holder for the market power conferred by inclusion of their patents in the standard provide a better framework for courts to employ in the evaluation of RAND licensing terms than the *Georgia-Pacific* framework. PX1036.

B. Mr. Donohoe's Opinions Regarding The Royalties Microsoft Should Pay

[redacted]

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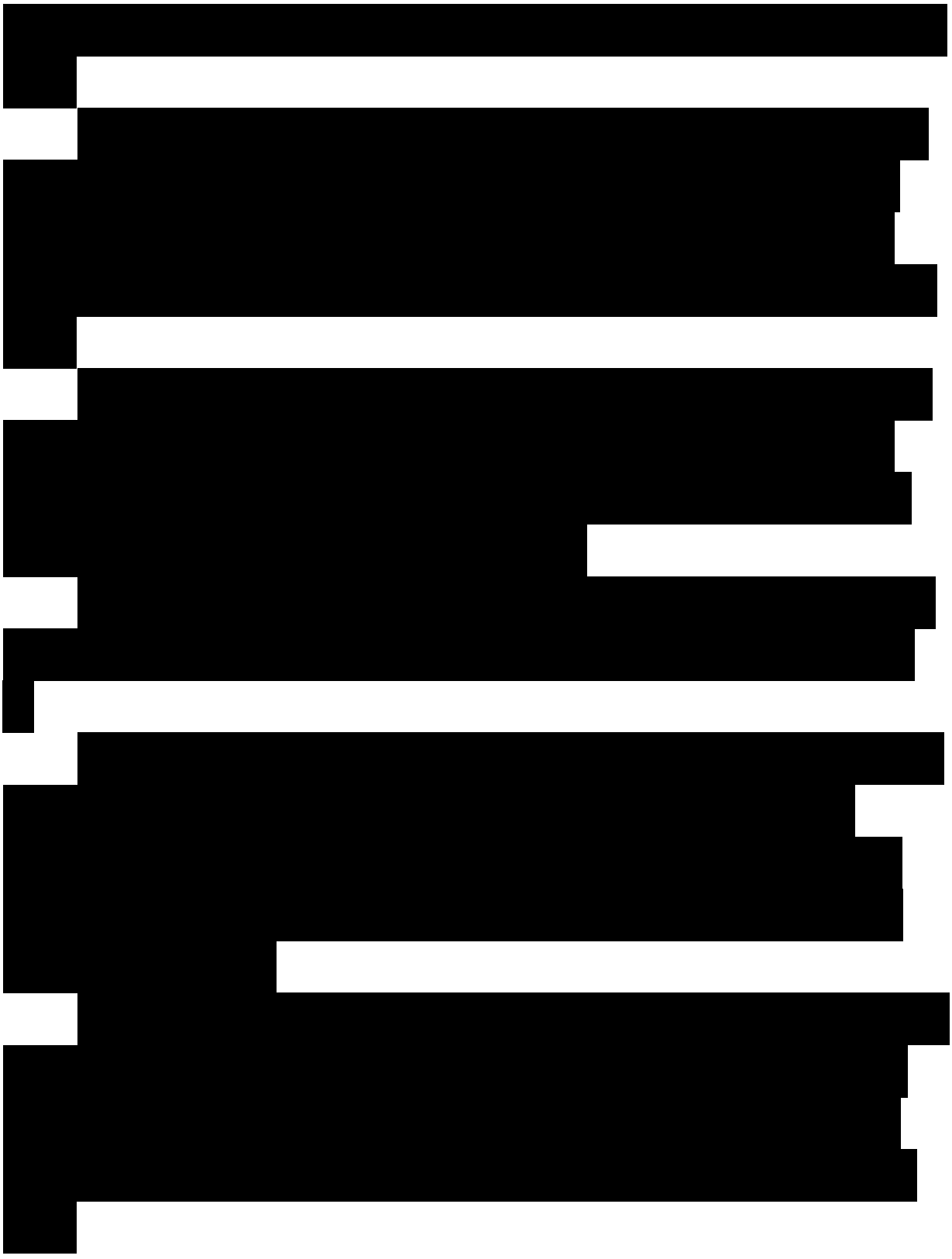

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[redacted]

X. THE ROYALTIES MOTOROLA SEEKS ARE NOT RAND

A. The *Georgia-Pacific* Hypothetical Negotiation Approach Employed By Motorola's Experts Does Not Address Hold-up Or Royalty Stacking

214. The Motorola experts' approach of determining RAND royalties based on the predicted results of a hypothetical negotiation occurring many years after the standards in question were adopted does not address the uneven bargaining power favoring the putative licensor that results from incorporation of its patents in the standard and the industry-wide investments made to implement the standard and here did not yield a reliable estimate of the terms of a RAND license. Trial Tr. __.

215. The *Georgia-Pacific* hypothetical negotiation approach as applied by Motorola's experts does not address the hold-up problem because the Motorola experts here make no effort to confine the royalty to no more than the incremental value of Motorola's patents apart from the value of implementation of the standards in question as a whole. Trial Tr. __.

216. The consistent focus of Motorola's licensing experts, Charles Donohoe and Michael Dansky, on the value to Microsoft of compliance with the standards rather than the

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incremental value of Motorola's specific SEPs illustrates that their methodology, as applied here, would permit Motorola to capture of the hold-up value of Motorola's SEP portfolio. Trial Tr. __.

217. Likewise, the *Georgia-Pacific* hypothetical negotiation approach as applied by Motorola's experts does not consider the larger context of the aggregate royalty burden that would be imposed on implementers if other SEP holders – of which there are many in relation to both the H.264 and 802.11 standards – sought royalties of a similar (or any) magnitude. Trial Tr. __.

B. The Royalties That Mr. Donohoe Opines Microsoft Should Pay Are Not RAND

218. The royalties that Mr. Donohoe opines that Motorola should receive from Microsoft are not RAND in either structure or level. The structure of the royalties, based on the percentage of the end product price, would force Microsoft to pay Motorola for functionality unrelated to Motorola's patents. In addition, economic evidence indicates that the royalty levels sought by Mr. Donohoe clearly exceed any approximation of the pre-adoption *ex ante* economic value of Motorola's patented technology. Trial Tr. __ .

1. Basing Royalties Here on a Percentage of the Price of Xbox or Windows Software As Proposed By Motorola Is Not RAND

219. Motorola has not established that 802.11 or H.264 compliance is the basis for consumer demand for Microsoft's multi-function, complex products like the Xbox gaming console and Windows operating system software, much less that standing alone its patented contributions to those standards are the basis for consumer demand for those products. Trial Tr. __ .

220. For that reason alone, Motorola's proposed methodology for determining royalties based on the entire market value of Xbox and Windows software is inappropriate. Trial Tr. __.

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221. Motorola's initial demand that Microsoft pay a royalty for H.264 based on the price of Windows-based *computers* that Microsoft does not even sell was even less likely to result in a RAND royalty. Trial Tr. __ .

[redacted]

223. Suppliers often sell different versions of a given product at different prices. Higher priced versions may include more features or additional functionality. When the additional functionality contained in higher priced version is unrelated to the patented technology at issue in a given case, a royalty based on a percentage of the selling price would lead to higher royalty payments for functionality unrelated to the patented technology. Trial Tr. __ .

224. By structuring the royalty as a percentage of the price of end products, e.g., Xbox consoles and Windows laptops (and, although not an end product, even just Windows), the licenses proposed by Motorola and envisioned by Mr. Donohoe would force Microsoft to pay an amount that was not calculated to relate to the value of Motorola's patents, but instead was based on the value of unrelated features offered by Microsoft of by the manufacturer of a Windows computer. Trial Tr. __ .

225. A royalty based on a percentage of the end product price would also perversely reduce Microsoft's incentive to incorporate additional value-added features into a product like Xbox, such as additional hard drive capacity, even when doing so would benefit Microsoft, consumers, game developers and accessory suppliers and achieve efficiency. Under the terms of Motorola's offer and the royalty structure proposed by its experts, because the incorporation of such features unrelated to Motorola's patents would increase the end price of the product,

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Microsoft would be required to pay Motorola a higher total royalty. A license in that form would essentially be a tax on Microsoft's integration of features unrelated to the patents or standards in suit. Trial Tr. __ .

226. Microsoft sells at least four different models of the Xbox 360 S gaming console: the price for the 4 gigabyte model is $199; the price for the 250 gigabyte model is $299; the price for the 4 gigabyte model bundled with the Kinect product is $299; and the price for the 250 gigabyte model with Kinect is $399. The prices for these products differ based on the amount of data storage and whether they include the Kinect product. All the products have the same built-in wireless networking and the same video capability that are claimed to implicate Motorola's patents in certain respects. Trial Tr. __ ; PX1652; PX1653.

227. Because Motorola's patents are unrelated to the functionality of either the data storage capacity or the Kinect product, the different prices for the different models of Xbox necessarily reflect features and functionality unrelated to Motorola's patents. But under the percentage royalty that Motorola demanded in October 2010 and that Mr. Donohoe opines is RAND, Motorola would have received a royalty twice as great on the 250 gigabyte model with Kinect in comparison to the 4 gigabyte model without Kinect. Trial Tr. __ .

228. Likewise, there are different versions of Windows (e.g., Windows 7 Home, Windows 7 Premium, Windows 7 Ultimate) available at a range of prices, [redacted] Trial Tr. __.

229. Under Mr. Donohoe's approach, Motorola would receive much higher royalties on a the more feature-rich Windows 7 Ultimate than on Windows 7 Home although the difference in the prices of those software packages is unrelated to Motorola's technology. Trial Tr. __.

230. In contrast to the percentage-based royalties that Mr. Donohoe opines would have resulted from a hypothetical negotiation, a survey of 26 collective licensing arrangements

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for SEPs shows that pools generally license SEPs on the basis of fixed per unit royalties rather than royalties based on a percentage of a product's selling price. PX1186.

2. Additional Economic Evidence Indicates That The Levels of Royalties Mr. Donohoe Opines Motorola Should Receive Are Not RAND

231. One informative way to test whether the royalties that Mr. Donohoe suggests Motorola should have received were RAND is to examine how much other licensors of SEPs for the same standards receive. Trial Tr. __ .

232. The royalties earned by pool members for H.264 and 802.11 SEPs are much less than the royalties proposed in Motorola's offers and those that Mr. Donohoe claims Motorola should receive. Trial Tr. __ .

233. Even without considering the caps that are integral part of the MPEG LA H.264 royalty structure, the per unit royalties for Windows that Mr. Donohoe says that Microsoft should pay for a license to Motorola's H.264 portfolio are [redacted] received by *all 26* MPEG LA H.264 patent pool members for a license to *all 2,400 plus* patents in the pool. Trial Tr. __ .

[redacted]

235. The total annual royalties that Mr. Donohoe opined that Microsoft should pay to Motorola for a license for Windows under Motorola's H.264 patents are thus [redacted] the total annual royalties that Microsoft pays to the MPEG LA for a license to the 2400 plus patents in the pool. Trial Tr. __.

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236. With respect to 802.11, the per unit rates implied by Motorola's 802.11 offer letter and Mr. Donohoe's testimony [redacted] that would be earned by all members of the Via 802.11 pool on a $200 Xbox. Trial Tr. __.

237. A comparison of the royalties Mr. Donohoe says Microsoft should pay for a license to Motorola's 802.11 SEPs to the cost of the chip that provides WiFi capability in the Xbox yields further economic evidence of the unreasonableness of Mr. Donohoe's opinions.

[redacted]

242. [redacted]

3. Royalties of the Magnitude Advocated by Mr. Donohoe Raise Significant Stacking Concerns.

243. Although the exact number of holders of SEPs relating to the 802.11 and H.264 standards is unknowable, there are at least 50 firms that submitted Letters of Assurance with

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respect to the H.264 standard and almost 100 firms that did so in connection with the 802.11 standard. Trial Tr. __.

244. Many of these firms do not presently proactively seek royalties from implementers of the standards in question. Trial Tr. __.

245. While aggregate royalty burdens have thus not yet impeded the adoption of the 802.11 and H.264 standards, if royalties of the magnitude that Mr. Donohoe claims Motorola is entitled to were endorsed, other holders of 802.11 and H.264 SEPs would be incented to seek similar royalties. Trial Tr. __.

[redacted]

247. Cumulative royalties at such levels could significantly impede implementation of the 802.11 and H.264 standards in the future and deprive users of the attendant benefits. Trial Tr. __.

C. Motorola's License Agreements Do Not Justify The Royalties That It Seeks[1]

[redacted]

[1] By contingently addressing Motorola's specific license agreements in the following findings, Microsoft does not concede their admissibility. For the reasons set forth in Microsoft's motion *in limine*, the Motorola license agreements Mr. Donohoe cites are inadmissible.

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250. None of these agreements is comparable to the license on RAND terms that Microsoft is entitled to under Motorola's RAND commitments to the ITU and IEEE. Trial Tr. __.

252.

1. Motorola's Licenses Are Not Comparable

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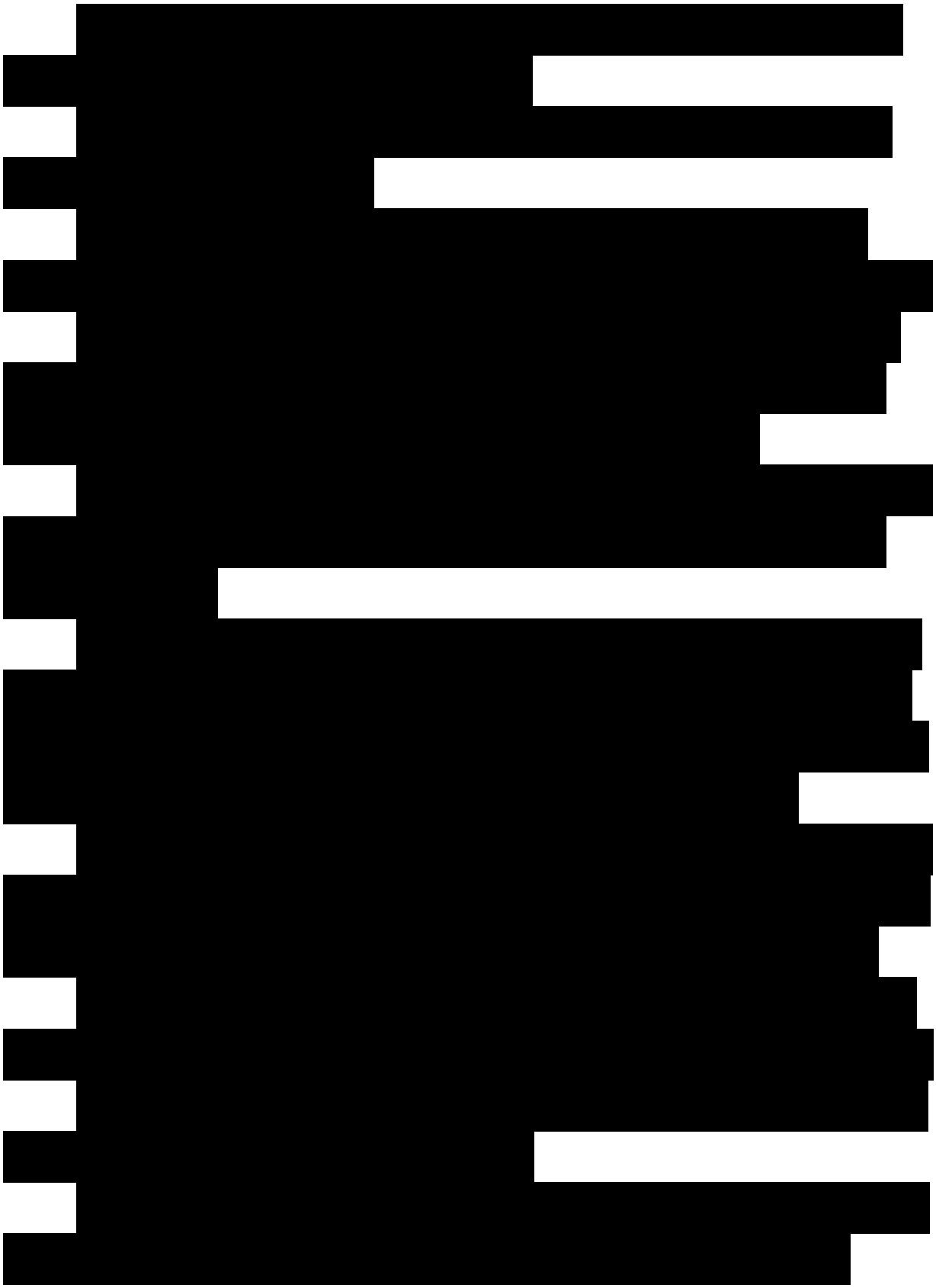

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[redacted]

2. Motorola's [redacted] Are Not Comparable

Mr. Donohoe analyzes [redacted]

(a) Mr. Donohoe Does Not (and Cannot) Apportion Royalties between 802.11 and/or H.264 Patents and Other Standards

[redacted]

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[redacted]

275. [redacted]

(b) The Specific Agreements [redacted] Are Not Comparable And Do Not Support The Existence of An Established Royalty Rate

[redacted]

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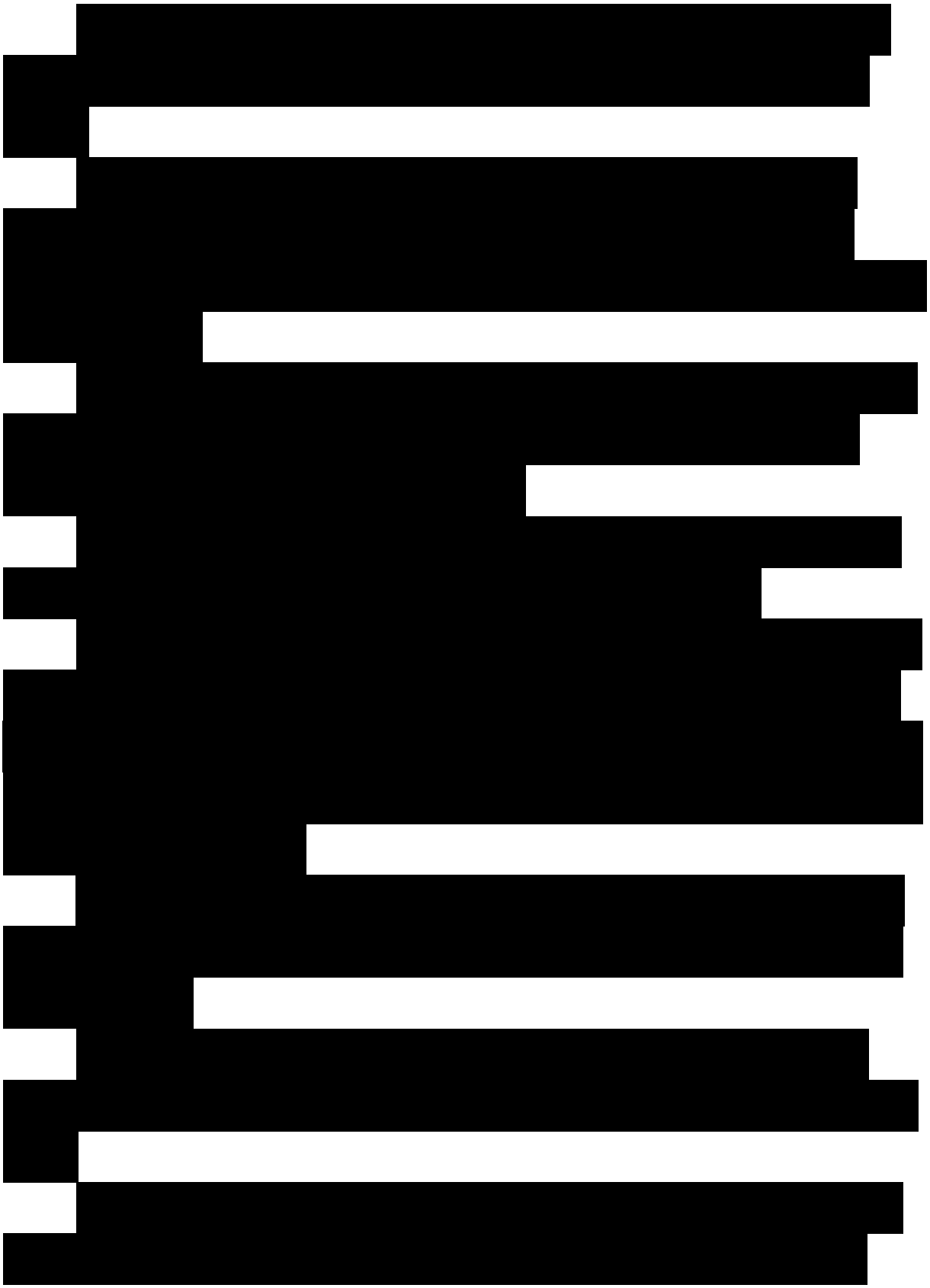

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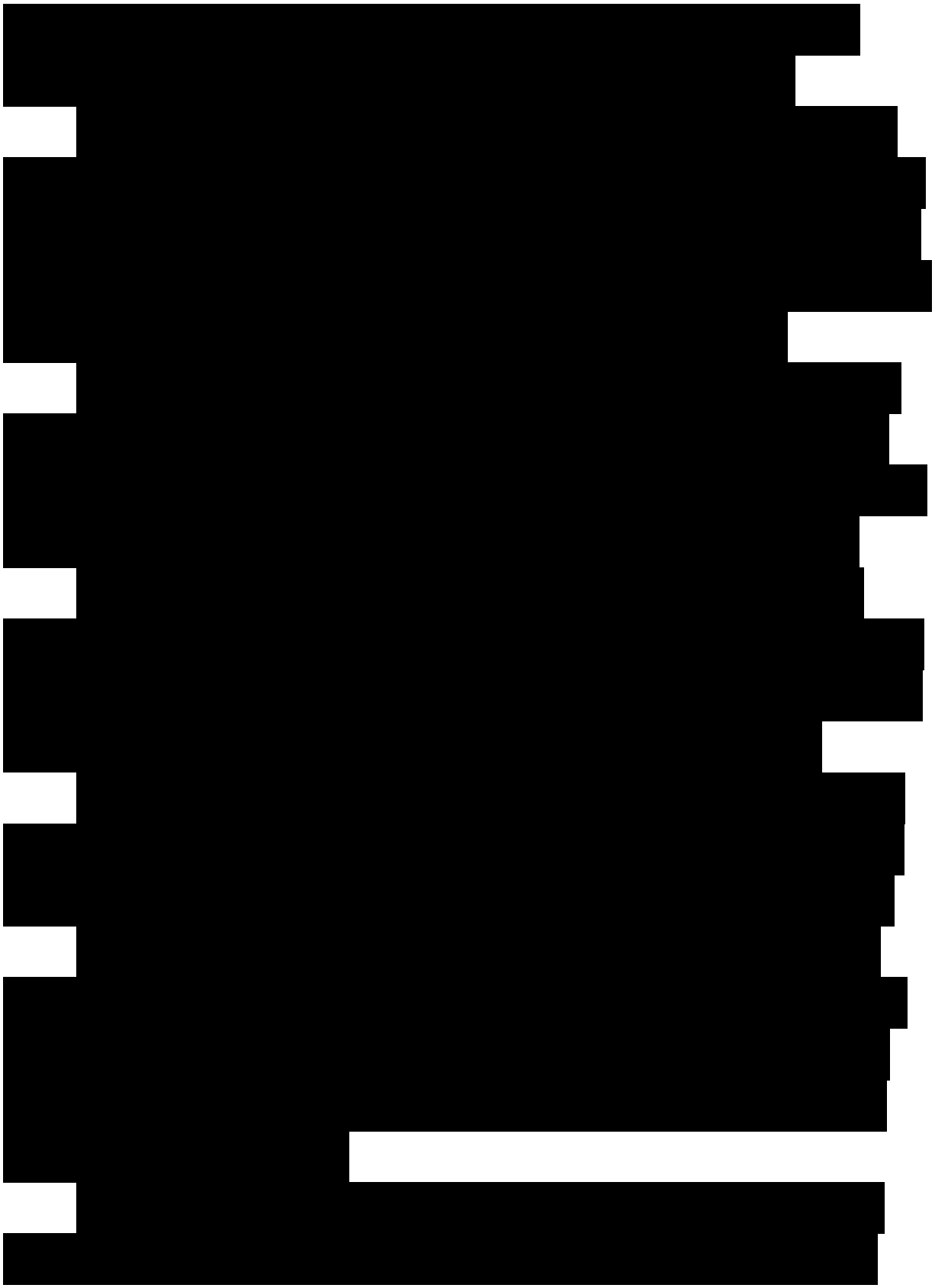

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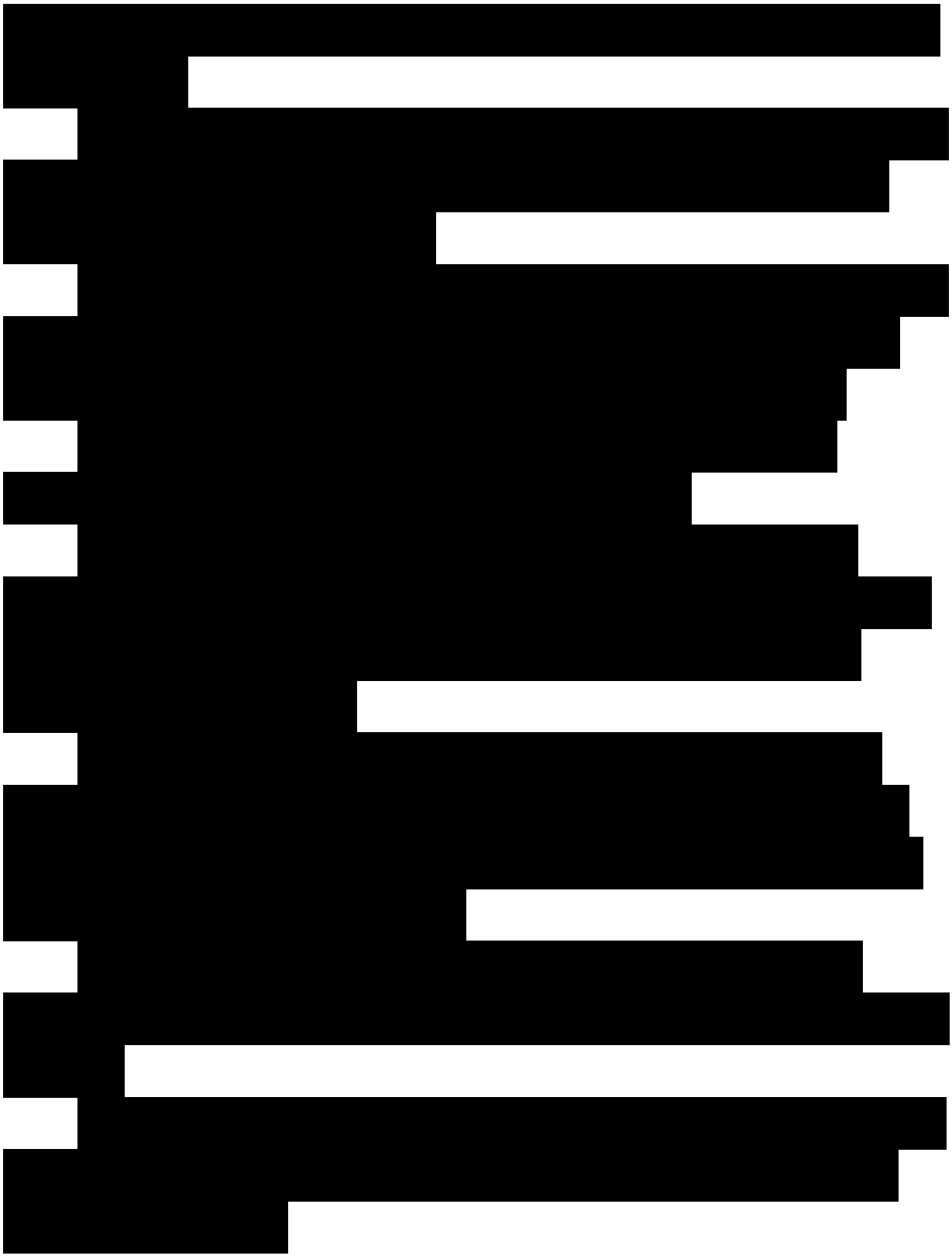

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302. [redacted].

3. The [redacted] Licenses Are Not Comparable

[redacted]

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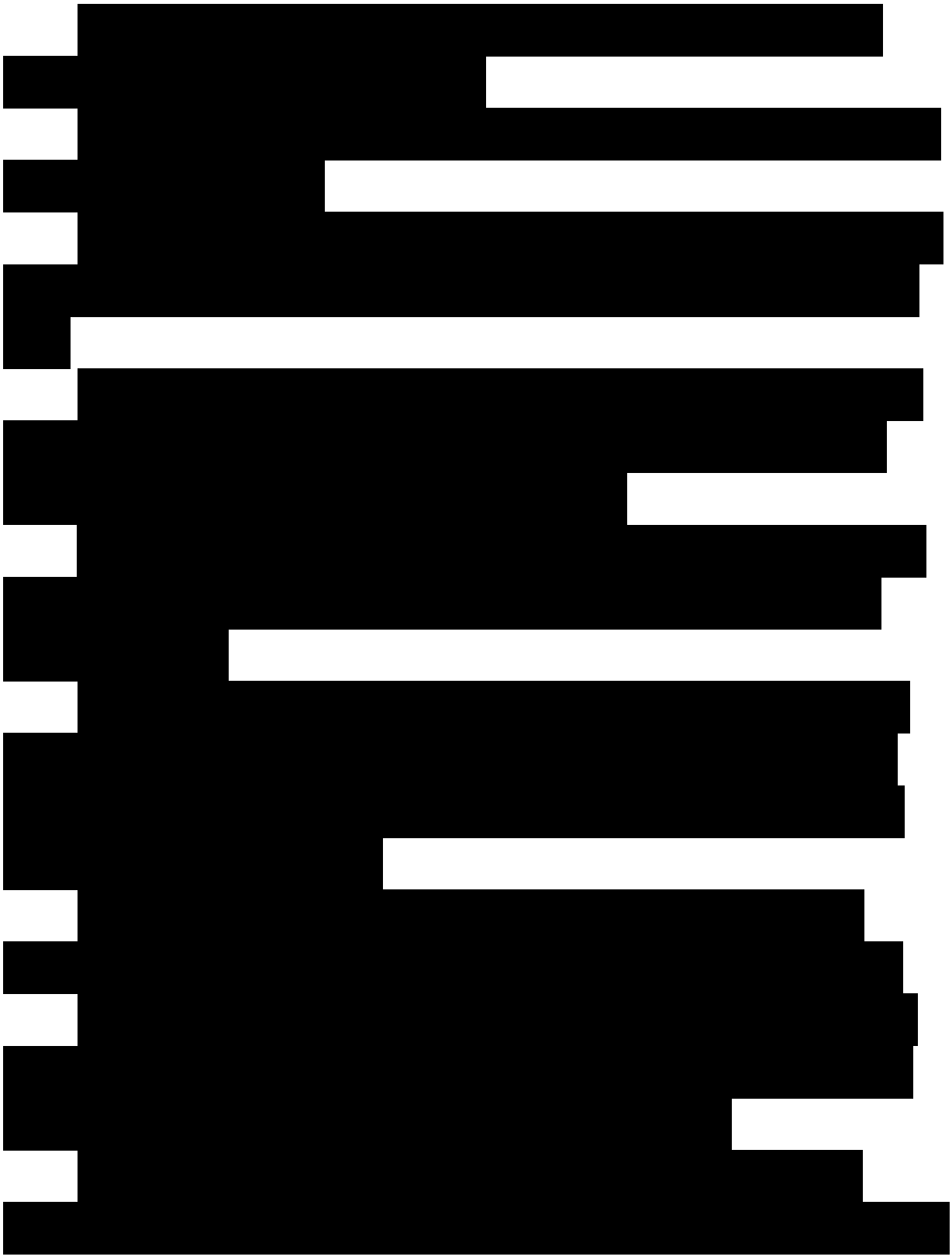

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[redacted]

4. The Alleged Royalty Demands of Other Holders of 802.11 SEPs Do Not Justify Motorola's Demands

319. [redacted]

320. None of these examples supports the reasonability of Motorola's demands or Mr. Donohoe's opinions here.

[redacted]

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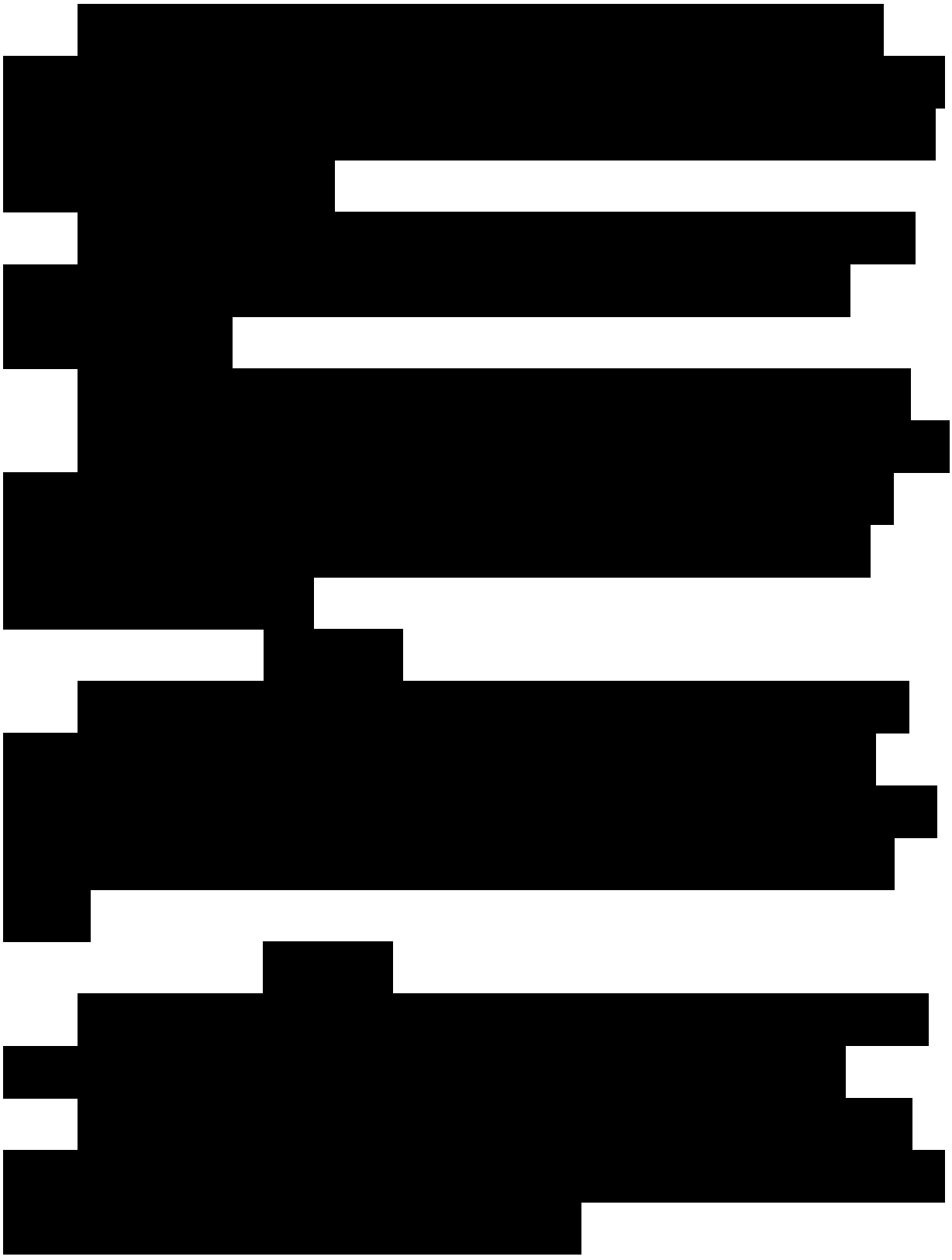

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[redacted]

5. Conclusion Regarding Motorola's License Agreements

[redacted]

D. Motorola's "Survey" Evidence Does Not Support Mr. Donohoe's Opinions[2]

333. Mr. Donohoe says that he relied upon a survey conducted on Motorola's behalf by R. Sukumar to support the proposition that "WiFi is a critical feature of the Xbox." Trial Tr. __.

334. While that claim evidences Mr. Donohoe's improper focus on the importance of the standard, rather than the value of Motorola's patented technology, to Microsoft, it also lacks adequate foundation because Mr. Sukumar's survey was flawed and unreliable.

1. Expert Qualifications

335. Dr. Sukumar has a background in marketing; he is not a trained statistician or economist. Dr. Sukumar does not have training in Bayesian statistics. Trial Tr. __.

[2] By contingently addressing Dr. Sukumar's survey results in the following findings, Microsoft does not concede that his testimony or survey results are admissible. For the reasons set forth in Microsoft's *Daubert* motion, it believes that Dr. Sukumar's testimony should be precluded in its entirety.

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336. Microsoft's expert, Peter Rossi, has a PhD in economics from the University of Chicago and has published more than 40 refereed articles and one book on topics in quantitative marketing, economics, statistics, and econometrics. Trial Tr. __.

337. Dr. Rossi's work on Bayesian methods for analysis of conjoint data provided the basis for the algorithms in the software (Sawtooth Software's Hierarchical Bayesian Analysis of Choice-Based Conjoint data (HB-CBC)) used by Dr. Sukumar for his conjoint surveys. Trial Tr. __.

338. Both Dr. Sukumar and Dr. Rossi have performed litigation and consulting work related to conjoint analysis. However, only Dr. Rossi has testified on valuation of apparatus and method patents with applications in the consumer electronics area. Trial Tr. __.

339. Dr. Rossi is more knowledgeable and more credible than Dr. Sukumar with respect to conjoint analysis and consumer research generally.

2. Dr. Sukumar's Survey Results Concerning "Willingness-To-Pay" Are Irrelevant

340. Dr. Sukumar employed a marketing company to contact members of its internet "panel" and invite them to respond to one of two surveys: one concerning 802.11 and another concerning H 264. Trial Tr. __.

341. The first part of each survey asked approximately 30 questions about demographics and usage of certain features or attributes of the Xbox. The second part of each survey employed "conjoint" methodology. The conjoint surveys consisted of 15 "choice" tasks, each specified by a screen with text inputs and with esoteric engineering specifications, discussed below. Trial Tr. __.

342. Conjoint analysis involves estimating a model of choice among the conjoint alternatives and establishing "partworths" for each sample respondent who completes the conjoint questionnaire. The partworths represent a measure of the value of the feature to each

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respondent. The units of measurement of these partworths are not in dollars but in an arbitrary "utility" scale. To interpret the results of the conjoint analysis, the partworths must be converted to dollars. This is done through a Willingness To Pay (WTP) calculation. The WTP calculation represents the maximum amount the respondent would be willing to pay for an Xbox with the feature being tested. Trial Tr. __.

343. Average WTP does not represent the market price of a feature; it is larger, and often much larger, than the market price. Trial Tr. ___.

344. Dr. Sukumar did not provide any evidence relating the patents-in-suit to the WTP calculated for the features tested in his surveys. Trial Tr. __.

345. Instead, the surveys attempt to value, generally, internal Wi-Fi functionality and the ability to play HD video content using the Xbox. Trial Tr. __.

346. None of the Motorola experts provided any analysis or guidance as to how Dr. Sukumar's WTP calculations could or should be used to value any of the Motorola patents.

347. The Sukumar conjoint surveys do not provide any information relevant to the issues to be determined by the Court in this case.

3. Dr. Sukumar's Survey Is Unreliable

348. In the field of consumer research, it is standard to "pre-test" a questionnaire with target consumers to determine whether the questions and suggested responses are well understood and not biased. Trial Tr. __.

349. Dr. Sukumar did not himself perform, or provide admissible evidence of, a reliable pre-test of his conjoint or usage surveys. Trial Tr. __.

350. The surveys employ highly technical terms, such as MBAFF and interlaced/progressive video scan, which were added at the request of trial counsel and were not pre-tested. Trial Tr. __.

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351. Lack of adequate pre-testing decreases reliability of the data collected from the conjoint and usage surveys. Trial Tr. __.

352. Dr. Sukumar has not demonstrated that survey respondents understood the technical terms used in the questions. The mere fact that some questions provided a "not sure" response option does not overcome this failure of proof. Trial Tr. __.

353. Dr. Sukumar provided no evidence of any efforts made to insure that the sample respondents devoted reasonable diligence to completion of the survey.

354. Seventy-five per cent of the respondents took less than 4.17 minutes to complete the 802.11 survey. Most respondents for the H 264 survey spent less than 5.4 minutes to complete all tasks. This speed of response is inconsistent with diligence or care on the part of the respondents and undermines the reliability of the survey results. Trial Tr. __.

355. There is no evidence of any efforts made by Dr. Sukumar or Authentic Response, the survey firm he worked with, to eliminate "professional survey takers" from respondents. Trial Tr. __.

356. Dr. Sukumar erroneously specified product attributes not by the features that consumers value but by engineering specifications. Trial Tr. __.

357. The typical consumer does not care whether the Xbox has H.264 decoding capability or 802.11 WiFi, but, instead, values the ability to view HD content or use wireless connections. Trial Tr. __.

358. Not all video that is available over the Internet is encoded using the H.264 standard. Dr. Sukumar's instructions to respondents, however, gave the false impression that anytime one streams or downloads video content from the internet, he/she uses the H.264 protocol. Trial Tr. __.

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359. There is no evidence to establish how a respondent could determine—from watching video content streamed from the internet or downloaded and played—whether the video is interlaced or progressive scan. Trial Tr. __.

360. There is no evidence that respondents could determine visually whether double or single MBAFF was employed. Trial Tr. __.

361. Dr. Sukumar used a non-random, convenience sample from an internet panel provider, Authentic Response. The fact that Authentic Response randomly sent invitations to members of its panel does not render the Sukumar samples random or projectible. Trial Tr. __.

362. Dr. Sukumar failed to demonstrate that his samples can be projected to the U.S. population of Xbox owners. Thus, the results of the survey are not reliable. Trial Tr. __.

363. The Authentic Response panel is skewed toward older and middle income U.S. residents, whereas the Xbox console appeals to younger people. Trial Tr. __.

364. Dr. Sukumar arbitrarily excluded owners under the age of 16 from his surveys. Trial Tr. __.

365. The surveys also arbitrarily excluded Xbox owners who do not connect to the internet. Trial Tr. __.

366. Of the 46,000 invitations sent by Authentic Response, only 7,500 individuals responded. The low response rate suggests that additional bias was introduced into the samples. Trial Tr. __.

367. Dr. Sukumar incorrectly imposed constraints on his analysis which biased his analysis toward higher WTP values for both the H.264 and 802.11 Wi-Fi features. Trial Tr. ___ (Rossi). Specifically, Dr. Sukumar imposed constraints on the partworths that insure that his estimates will always value an Xbox product with H.264/802.11 features higher than the product without. This arbitrarily precluded the possibility that his survey would find the features in question to be of zero value. Trial Tr. __.

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368. Dr. Sukumar provided a number of statistical summaries of his 802.11 and H.264 survey data. He did not provide a margin of error for any of these sample-based estimates. Trial Tr. __.

369. Dr. Sukumar incorrectly calculated "lower" and "upper" confidence interval "limits" for his WTP estimates. Trial Tr. __. However, Bayesian methods do not produce confidence limits. Trial Tr. __.

370. Dr. Sukumar misapplied a classical statistical formula to compute confidence limits for WTP and thus understated the margins of error for WTP. Trial Tr. __.

371. The cumulative errors and omissions in the Sukumar consumer research render his conjoint and usage surveys unreliable and his testimony not credible.

XI. THE H.264 STANDARD AND THE PARTIES' H.264 SEPS

A. Background on Video Processing

1. Interlaced Video

372. Most of the patents Motorola asserts are essential to the H.264 standard (14 of 16) are useful only for interlaced coding. Legacy television systems in the United States use interlaced capture, in which the camera scans half of the picture (the even lines or the odd lines) before scanning the other half of the picture. The collection of odd lines is the "odd field," and the collection of even lines is the "even field." PX572 at pp. 81-82, 113; Trial Tr. __.

373. "Progressive" capture, unlike interlaced capture, captures all of the lines of a frame consecutively from top to bottom rather than alternating between odd and even fields. PX572 at p. 113; Trial Tr. __.

2. Digital video and basic compression techniques

374. Early video systems captured and processed video as an analog signal. PX572 at pp. 1-4; Trial Tr. _. Digital video is created by converting analog video signals into strings

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of 1's and 0's. PX572 at pp. 1-3; Trial Tr. _. This results in a large amount of data that can be efficiently compressed. PX572 at pp. 2-3; Trial Tr. _. Compressing digital data is called "encoding." Reconstructing the video for display is called "decoding." PX572 at pp.6-9; Trial Tr. __.

375. The term "interlaced" can refer to more than one thing with respect to digital video. The first, interlaced captured video, refers to video in which the odd and even lines comprising each picture have been captured separately, as in the analog world. PX572 at pp. 81-82. Interlaced can also refer to encoding interlaced captured video using special tools, called interlaced coding tools, that are adapted for interlaced captured video. Trial Tr. __. The "interlaced coding tools" are used for encoding and decoding interlaced video and for coding odd and even fields separately in some situations. Some video coding standards, such as MPEG-1, did not offer any interlaced coding tools and processed interlaced captured video and progressively captured video the same way. PX585 at p. 179; Trial Tr. __. Other video coding standards, such as MPEG-2 and H.264, offer interlaced coding tools that can be used to code interlaced captured video. *See, e.g.*, PX585 at pp. 178-182; PX424 at p. 566. Whether interlaced coding tools are available or not, video captured in interlaced form can optionally be encoded using use the same coding tools used for progressively captured video. Trial Tr. __.

376. Video coding standards going back decades, including H.264, have used the same four categories of tools for video compression: prediction, transform, quantization, and entropy coding. *See, e.g.*, PX576 at pp. 82, 179; PX628 at Fig. 2; Trial Tr. __.

377. Of its 40 patents essential to the H.264 standard, Microsoft owns fifteen patents essential to these categories, including patents related to prediction, transform, and quantization. *See* PX1575. Microsoft has one essential patent related to motion compensation: U.S. Patent No. 7,609,767. Microsoft has an additional three patents related to a feature called "direct mode" that is relevant to both temporal and spatial prediction: U.S. Patent Nos.

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7,003,035; 7,280,700; and 7,646,810. Microsoft also holds five patents related to H.264's spatial extrapolation architecture: U.S. Patent Nos. 7,116,830; 7,162,091; 7,181,072; 7,263,232; and 7,577,305. Microsoft has six patents essential to H.264's transform and quantization architecture: U.S. Patent 6,882,685; 7,106,797; 7,773,671; 7,839,928; 7,881,371; and 7,266,149. Motorola has two patents related to these categories: U.S. Patent No. 5,235,419 to Krause and U.S. Patent 5,376,968 to Wu, both related to prediction. The balance of Motorola's patents either do not relate to these categories at all or relate to these categories only in ways specific to interlaced coding. *See* PX1569.

B. Video coding standards

378. H.264 is the successor to two earlier families of standards, MPEG-x and H.26x. *See, e.g.*, PX579; PX421 at pp. i, xviii; PX959; Trial Tr. __.

379. The earlier MPEG-x and H.26x standards use many of the same technologies used by H.264. H.264 made incremental coding gains because many companies offered many contributions to improve many aspects of the tools for prediction, transform, quantization, and entropy coding. *See* 1576; PX1577; Trial Tr. __.

1. MPEG standards

380. The MPEG-x family is administered by the ISO and the IEC. *See, e.g.*, PX949; Trial Tr. __.

381. MPEG was formed in 1988 and its first standard, MPEG-1, was published in early 1993. PX585 at p. 152; PX578 at p. 2; PX974; Trial Tr. __.

382. MPEG-2, also known as H.262, became a standard in 1995. PX585 at p. 172; PX579 at p. 4626; Trial Tr. __. MPEG-2 included interlaced coding tools that exploited a known technique for coding interlaced video: for parts of scenes having motion, coding can be more efficient if the even and odd fields are coded separately. Trial Tr. __. MPEG-2 also included a special scan path for interlaced video. Trial Tr. __.

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383. MPEG's next standard was MPEG-4. PX585 at p.196; Trial Tr. _Trial Tr. __. MPEG-4 Part 2 (video) became a standard in 2000. PX585 at p.196; PX945; Trial Tr. __.

2. H.26x Standards

384. The H.26x family is administered by the ITU. PX579; PX421 at p. xviii; PX576 at p. 5; PX615 at pp. 11-13; Trial Tr. __.

385. H.261 was published as a standard in November 1988. PX636; PX579 at p. 4623; Trial Tr. __.

386. H.263 was developed by ITU in the early 1990s and published in March 1996. PX579 at p. 4625; PX984; PX682; Trial Tr. __.

3. H.264's development

387. H.264 is a technology standard for coding and compressing digital video content. *See, generally*, PX421; PX576; Trial Tr. __. The H.264 standard is published by ITU as "Recommendation H.264: Advanced Video Coding for Generic Audiovisual Services Recommendation H.264" and by ISO/IEC as "International Standard ISO/IEC 14496-10 (MPEG-4 Part 10) Advanced Video Coding (AVC)." PX424 at p. 560; Trial Tr. __.

388. H.264 began in early 1998 when a committee of experts within the ITU called the Video Coding Experts Group ("VCEG") launched H.26L. PX424at p. 560; PX416; Trial Tr. __.

(a) The VCEG's work

389. H.264 began as a proposal, adopted by VCEG, from a company called Telenor Satellite Services ("Telenor") in October 1998. PX747; Trial Tr. __. Telenor's proposal included features that distinguished H.264 from prior coding standards, including: use of variable block sizes as small as 4x4; multiple blocksize prediction; the integer transform; spatial prediction/extrapolation; multiple reference frames for prediction; and enhanced spatial prediction. PX747; *see also* PX744; Trial Tr. __.

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390. VCEG then created an early draft, called H.26L, that included technical contributions submitted by many companies and discussed during quarterly meetings. *See* PX936; Trial Tr. __. VCEG meeting summaries included attendance records showing that meetings had many participants from many companies. *See, e.g.*, PX1460-1472 ("VCEG meeting summaries"); Trial Tr. __.

391. The VCEG meetings (from June 1997 through September 2001) generated close to 1000 contribution documents. *See* PX936; Trial Tr. __. Motorola did not offer any technical contributions for H.26L during the VCEG meetings. *See* PX936; VCEG meeting summaries; Trial Tr. __.

(b) MPEG's decision to join VCEG

392. While VCEG was working on H.26L, MPEG was working on MPEG-4. Motorola was part of MPEG. PX416.

393. [redacted]

394. VCEG later confirmed H.26L's advantages in objective tests that showed that H.26L outperformed MPEG-4. PX773; PX776; PX768; PX769; Trial Tr __. MPEG also conducted tests on VCEG's H.26L and confirmed that it outperformed MPEG-4. PX774; Trial Tr. __.

395. In response to the tests, MPEG sought to join VCEG rather than continuing development of MPEG-4. PX775; Trial Tr. __. VCEG agreed. PX789.

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(c) JVT Meetings and contributions

396. After MPEG and VCEG merged to form the JVT, the JVT continued developing H.26L under the name H.264. *See* PX935.

397. The JVT kept archives of its meetings. PX935. The JVT kept minutes summarizing its meetings. *See* PX1473-1501; PX1570. For the JVT meetings from December 2001 through July 2009, there were more than 2000 contribution documents, some of which were substantive and some of which were not. Trial Tr. __; *see, generally,* PX935.

398. Motorola submitted twenty-five substantive contribution documents. Seven related to technology that was never adopted into H.264. All eighteen other contributions related to interlaced coding tools. Trial Tr. __; *see* PX1573, PX1574. None of Motorola's adopted contributions were applicable outside of the interlaced coding tools or applicable at all to progressively coding video. Trial Tr.; *see* PX1573, PX1574.

4. The H.264 Standard

399. H.264 has the same core video coding components as prior standards: prediction, transform, quantization, and entropy coding. Trial Tr. __; *see, generally*, PX576 at pp.82, 179.

400. H.264 provided coding gains as a result of many contributions from many companies related to improvements to these components. *See, e.g.*, PX1576, PX1577, PX935; Trial Tr. __; Luthra Dep. at 45–51. On average, H.264 provides about a 50% improvement over prior video coding standards. Trial Tr. __; Luthra Dep. at 31; PX424 at p. 575. Video compression efficiency is measured based on the bitrate, which is the number of bits needed to represent the video for a given amount of time, with a smaller number of bits representing better compression. A video's bitrate, holding all else such as video quality equal, depends on the characteristics of the video being compressed. The average bitrate for a compression standard, or bitrate improvement between an old and new standard, therefore includes a wide

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variation of bitrates for particular videos. For that reason, the maximum measured bitrate improvement does not accurately show a compression algorithm's efficiency or whether a change to an algorithm is better or worse than the original because the test video on which the maximum bitrate improvement occurred might be unrepresentative. Trial Tr. __.

401. Interlaced coding tools, including adaptive frame/field coding, are not considered a core H.264 component. These tools are not used for progressively coding video. PX576 at pp. 82, 179; Trial Tr. __.

402. H.264 supports multiple "profiles." Each "profile" specifies a subset of the tools included in H.264. PX421 at pp. 286-291; PX576 at pp. 92-93, 224-226; Trial Tr. __. Often used profiles include Constrained Baseline, Baseline, Main, and High. PX421 at p. 4; PX576 at pp. 224-226; Trial Tr. __.

403. H.264 supports multiple "levels" within each profile. PX421 pp. 291-305; PX576 at pp. 226-229; Trial Tr. __. A combination of an H.264 profile and level defines a specific subset of tools that a decoder fully conformant with that profile and level must support. PX576 at p. 224; Trial Tr. __.

404. Interlaced coding is not supported in the Constrained Baseline or Baseline profiles for any level. PX1477; PX421 at pp. 77, 286, 299; Trial Tr. __. Interlaced coding is not supported for levels 1-2 and 5-5.2 for any profile. PX421 at pp. 77, 286, 299; Trial Tr. __. Motorola tried without success to persuade the JVT to include interlaced coding in the baseline profile. PX671; Trial Tr. __. Many companies objected to MMI's suggestion. PX706; PX715; Trial Tr. __.

405. The H.264 standard does not specify how encoders should operate and does not require encoders to support or utilize any particular coding tool, even if they support a particular profile and level that include that tool. PX612 at 3.42; *id*. at Annex A.

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406. When using the H.264 standard, progressive coding provides better compression than interlaced coding. Trial Tr. __; PX633; *id*. at p. 429; *see* PX595.

407. Progressive coding is favored over interlaced video for use in modern H.264 systems. This is particularly true for video that will be distributed over the Internet or displayed on computing devices such as desktop computers, laptops, smartphones, tablets, and other mobile devices. Trial Tr. __.

408. Patents relating only to the coding of interlaced video are of limited importance to the H.264 standard. Trial Tr. __.

(a) H.264 Essential Patents

409. MPEG LA offers licenses to a pool of patents essential to H.264. PX1059. Patents in the MPEG LA pool have been independently evaluated by patent experts that have confirmed their essentiality before those patents were placed into the pool. PX977; Trial Tr. __.

410. Twenty-nine companies have essential patents that are licensed by the MPEG LA pool. PX946; PX1094; PX1572; Trial Tr. __. The MPEG LA pool, as of May 1, 2012, contains 2458 total patents, including 328 U.S. patents. MPEG-LA's experts have organized the MPEG LA pool patents into 102 categories of coding tools, including 71 categories for U.S. patents. PX957; PX976; PX1572; Trial Tr. __.

411. Some companies, including Motorola, do not participate in the MPEG LA pool. PX1094 Trial Tr. __.

412. Many companies that are not part of MPEG LA declare essential patents to the H.264 standards-setting bodies. Trial Tr. __; PX598; PX947. At least 100 other patents, including 37 U.S. patents, have been declared essential to ITU or ISO/IEC by non-MPEG LA members. PX598; PX947; PX1572; Trial Tr. __. An additional 19 other companies submitted

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blanket commitments regarding their H.264 essential patents without specifically identifying or enumerating the number of essential patents that they own. PX1572; Trial Tr. __.

413. H.264 uses a substantial amount of technology that either was never patented or was covered by now-expired patents. For example, the most important techniques used for prediction, transform, quantization, and entropy coding have existed in standards for more than 25 years. In addition, Telenor, which created the original H.26L proposal that included features distinguishing H.264 from prior coding standards, did not patent its contributions. Trial Tr. __.

C. Motorola's Patents

414. Motorola owns a small number of United States patents that it asserts are essential to the H.264 standard. Trial Tr. __; PX1739; PX1569. Motorola has 16 United States patents asserted to be relevant to the H.264 standard, compared to 328 standard essential United States patents owned by MPEG LA companies and 37 declared by non-MPEG LA companies. Trial Tr. __; PX523; PX1572. Similarly, Motorola owns a small number of the total world-wide patents that are essential to the H.264 standard. Trial Tr. __. Motorola claims that it has 78 patents worldwide that are essential to the H.264 standard. MPEG LA companies own 2,458 patents that have been deemed essential to the H.264 standard. Trial Tr. __; PX523; PX957. In addition, these raw numbers of Motorola owned patents overstate Motorola's contribution to the H.264 standard because many of Motorola's patents are related, deriving from the same original patent filing. For example, eight of the 16 patents asserted to be essential to the H.264 standard relate to MBAFF and all derive from the same patent application, share the same specification, and claim variants of one another. Similarly, its three PICAFF patents derive from the same initial filing. Trial Tr. __.

415. Motorola's H.264 patents relate to only a few features in H.264 compared to the wide variety of features to which the full universe of H.264 essential patents relate. *See*

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PX1569; PX1572; Trial Tr. __. Motorola's H.264 patents mostly relate to interlaced video coding with fourteen of the seventeen patents that Motorola asserts are essential to H.264 relating only to interlaced coding. Trial Tr. __.

416. The MPEG LA categorizes patents into 102 different technical categories, with each category containing several patents, dozens of patents, or in some cases hundreds of patents. Trial Tr. __; PX592. Motorola's H.264 patents can be categorized into 4-5 categories out of the 102 total categories, depending on the methodology that one uses to categorize them. Trial Tr. __.

417. Although referenced by Motorola's expert, two of Motorola's patents are not essential to the H.264 standard. Motorola's United States Patent 6,836,514 is not essential to the H.264 standard or used in applications that conform to the H.264 standard. PX523. Motorola's United States Patent 6,807,317 is not essential to the H.264 standard or used in applications that conform to the H.264 standard. PX523. In reexamination of United States Patent 6,807,317 before the United States Patent and Trademark Office, the only claim that Motorola once asserted was relevant to H.264 was canceled in light of an early version of H.264. Trial Tr.; __; PX1664.

418. As analyzed below on a per patent family basis, Motorola's patents at most cover H.264 features utilized in limited, specific scenarios, such as interlaced coding. These patents cover H.264 features that had readily available alternatives. Many of these patents claim features that were all or substantially all in the prior art, raising serious questions about their validity. Trial Tr. __.

1. US Patent No. 5,235,419

419. U.S. Patent No. 5,235,419 (" '419 patent" or "Krause patent") claims a priority date of October 4, 1991 and expired in October 2011. Motorola has never asserted this patent

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against Microsoft's use of the H.264 standard in any U.S. court or in the International Trade Commission. Trial Tr. __.

420. The '419 patent relates to a selection criteria used in the encoding process for selecting a block size while performing motion compensation. *See* PX621; Trial Tr. __. The '419 patent claims using a selecting criteria to choose between multiple "motion compensators" by preliminarily encoding video using each of the motion compensators, comparing the number of bits created by each, and then choosing the motion compensator that produced the fewest bits to create the encoded output. *See, e.g.,* PX270 at cl. 1; Trial Tr. __. The '419 patent also claims a technique for decoding video using the '419 patent's encoding technique and a specific way of identifying the motion compensator used. Trial Tr. __.

421. Motorola asserted the European counterpart (EP0538667) of the '419 family against Microsoft in Germany but has not asserted any other patents in this family in the United States or elsewhere. Only a decoder claim was asserted in Germany. Trial Tr. __. When Motorola asserted the German counterpart to the '419 patent against Microsoft, Microsoft initiated a nullity action by which it challenged the validity of those counterpart patents. Microsoft was required to abandon its nullity action in order to avail itself of the Orange Book procedure, and no validity determination has been or will be made. *See* PX1509.

422. Motorola included the '419 patent in MPEG-LA's MPEG-4 Part 2 portfolio, to which Microsoft has a license. Motorola has thus been willing to license this patent to a pool in the past. PX975 at p. 4; Trial Tr. __.

423. Despite attendance at multiple relevant VCEG meetings Motorola attendee ever disclosed or identified the '419 patent as having any relationship to H.264. PX936; ; PX935; Trial Tr. __.

424. Motorola reads the '419 patent on H.264's use of different block sizes for temporal prediction. (*Compare* PX621 at pp. 21-29 *with* PX621 at pp. 36-49.) H.264's use of

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multiple block sizes for prediction was the result of a combination of proposals by Telenor and Nokia. Trial Tr. __; PX636; PX747; PX750; PX752; PX748, PX755; PX761.

425. Motorola asserts that the H.264 standard requires using claim 20 of the '419 patent. Trial Tr. __. Claim 20 is the '419 patent's only independent claim applicable to a decoder. Trial Tr. __. Motorola has analyzed only claim 20 of the '419 patent with respect to the H.264 standard. Trial Tr. __.

426. One element of claim 20 requires an encoder to have previously used a "selection criteria" for selecting among multiple motion compensators. The H.264 Standard specifies a decoding process, not an encoding process, and therefore does not require an encoder to use any particular selection criteria. PX421 at § 3.49. The encoder that created the video content being decoded by Microsoft's products could have used any encoding technique, including not selecting among multiple motion compensators. Trial Tr __.

427. The '419 patent discloses selecting from among multiple motion compensators to minimize the encoder's output bitrate, *i.e.*, the size of the compressed video. Trial Tr. __. H.264 does not use the selection criteria in the '419 patent for selecting motion compensators, which provides inferior performance compared to the technique used by H.264. Trial Tr. __ PX620. Instead, H.264 uses a different criteria called rate-distortion optimization, which provides better performance. Trial Tr. __.

428. Alternative techniques existed and were available to the JVT for selecting different block sizes for motion compensation. One alternative was a technique for adaptive block size selection disclosed in an article by Puri *et al.* called Interframe Coding with Variable Block-size Motion Compensation. PX634. The Puri article was published in November 1987 and was therefore available during H.264's development. Another alternative for adaptive block size selection was a technique disclosed and patented by AT&T in U.S. Patent No. 5,144,423 ("AT&T's '423 patent"). PX1505. AT&T's '423 patent issued on September 1,

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1992 and was therefore available during H.264's development. A third alternative for adaptive block size selection was a technique disclosed in the Ph. D. Thesis of Dr. Gary Sullivan. PX620; PX635. Dr. Sullivan's thesis was made publicly available by September 1991 and was therefore available during H.264's development. Another alternative was shown in CCITT SGXV Document #453, Oslo, March 1989 PX463. Motorola has not identified test results showing that the technique claimed in the '419 patent offers a performance benefit over these already known techniques. The H.264 features that Motorola asserts require using the '419 patent provided little, if any, benefit over alternatives that the H.264 standard could have used instead because the alternatives would have achieved a comparable result. Trial Tr. __.

429. The differences between the prior art and the '419 patent also impact the value of that patent. AT&T's '423 patent and Dr. Sullivan's thesis disclose the features of claim 20 of the '419 patent. AT&T's '423 patent was filed on December 11, 1990 and Dr. Sullivan's thesis was publically available by September 1991. As such, both documents qualify as prior art under 35 U.S.C. § 102 with respect to the '419 patent. PX1505; PX620; PX635. AT&T's '423 patent and Dr. Sullivan's thesis each disclose all elements of claim 20 of the '419 patent. Trial Tr. __.

430. The only claim Motorola identified in this patent, claim 20, has "means plus function" elements. The Krause patent's specification discloses structures corresponding to the recited functions that are implemented exclusively in hardware. PX270 at 8:52-9:17) ("circuits," "terminals," "switches," "latches," and "demultiplexers.") The Krause patent's specification does not disclose any software structures. The video coding industry distinguishes between hardware decoders and software decoders. Microsoft's products use software, not hardware, to decode H.264 and therefore would not practice this claim in using the H.264 standard. Trial Tr. __.

2. U.S. Patent 5,376,968

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431. U.S. Patent 5,376,968 (" '968 patent" or "Wu patent") claims a priority date of March 11, 1993. The '968 patent will expire in March 2013. Motorola has never asserted this patent against Microsoft's use of the H.264 standard in any U.S. court or in the International Trade Commission.

432. The '968 patent relates to using a selection criteria to choose between multiple compression modes by preliminarily encoding video using each of the compression modes, comparing the number of bits created by each, and then choosing the compression mode perceived as producing the least number of bits to create the encoded output. The '968 patent also claims a technique for decoding video using the '968 patent's encoding technique and a specific way of identifying the compression mode used. *See, e.g.*, PX283 at cl. 1; PX621 at pp. 29-30; Trial Tr. __.

433. Motorola asserted the European counterpart (EP0538667) of the '968 family against Microsoft in Germany but has not asserted any patents in this family in the United States or elsewhere. Motorola asserted only a decoder claim in Germany. When Motorola asserted the German counterpart to the '968 patent against Microsoft, Microsoft initiated a nullity action by which it challenged the validity of that counterpart patent. Microsoft was required to abandon its nullity action in order to avail itself of the Orange Book procedure, and no validity determination has been or will be made. *See* PX1509.

434. Motorola did not submit any contribution documents to the JVT developing H.264 related to the claimed subject matter of the '968 patent. Trial Tr. __.

435. Motorola analyzed claim 19 of the '968 patent. Claim 19 is the only independent claim in the '968 patent applicable to a decoder. Motorola has analyzed only claim 19 of the '968 patent with respect to the H.264 standard. Motorola asserts that this claim is essential to H.264's use of different block sizes for temporal prediction. Trial Tr. __.

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436. The section criteria used by the '968 patent for selecting motion compensators is not used by H.264 devices. The '968 patent discloses selecting motion compensators to minimize bitrate, which provides inferior performance to the criterion currently used by H.264, called rate-distortion optimization. Trial Tr. __ ; PX620.

437. Alternative techniques for using different block sizes for motion compensation were known when the JVT was developing H.264 and could have been adopted into H.264. These techniques include an article by Puri *et al.* called Interframe Coding with Variable Block-size Motion Compensation and published in November 1987, (PX634); a technique disclosed and patented by AT&T in U.S. Patent No. 5,144,423 ("AT&T's '423 patent"), filed on December 11, 1990, (PX1505); a technique disclosed in CCITT SGXV Document #453 (PX463), Oslo, March 1989; and a technique disclosed in the Ph. D. Thesis of Dr. Gary Sullivan, which was made available to the public by September 1991. PX620; PX635; Trial Tr. __. Motorola did not identify any test results showing that the technique claimed in the '968 patent would offer a performance benefit over these already known alternative techniques. Even entirely removing the use of different block sizes for motion compensation from H.264 would reduce coding efficiency only by approximately 2.5%. PX792; Trial Tr. __. In other words, removing far more functionality than Motorola asserts the '968 patent covers would result in only a 2.5% increase in the size of the encoded video (all else being equal, including video quality). Trial Tr. __.

438. The only claim Motorola identified in this patent, claim 19, reads on the prior art, raising serious questions about its validity and showing that any inventive contribution was slight. The H.261 Standard (PX636) was published in November 1988. It discloses a technique for adaptively selecting from multiple compression modes and includes the claimed features of claim 19 of the Wu patent. Trial Tr. __. U.S. Patent 5,227,878 to Puri ("the Puri patent") was filed November 15, 1991. PX619. It also discloses a technique for adaptively

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selecting from multiple compression modes and includes the claimed features of claim 19 of the '968 patent. Trial Tr. __. Annex L.12 of ISO/IEC document AVC-356 ("the MPEG-2 test model") was published on October 19, 1992. It similarly discloses a technique for adaptively selecting from multiple compression modes and includes the claimed features of claim 19 of the '968 patent. Trial Tr. __.

439. Claim 19 of the '968 patent has "means plus function" elements. The '968 patent's specification discloses structures corresponding to the recited functions that are implemented exclusively in hardware. PX283 at 12:14-13:11) ("circuits," "terminals," "switches," "adders," "latches," and "demultiplexers.") The '968 patent's specification does not disclose any software structures. Microsoft's products use software, not hardware, to decode H.264 and therefore would not practice this claim in using the H.264 standard. Trial Tr. __.

3. The Wang "MBAFF patents"

440. The "MBAFF patents" include U.S. Patent Nos. 6,980,596 (" '596 patent"), 7,310,374 (" '374 patent"), 7,310,375 (" '375 patent), 7,310,376 (" '376 patent), 7,310,377 ("'377 patent), 7,421,025 (" '035 patent), 7,477,690 (" '690 patent), and 7,817,718 (" '718 patent). The MBAFF patents all share a common specification and claim priority to common priority documents, the earliest of which was a provisional application filed November 27, 2001. The application for the '596 patent was filed first among the MBAFF patents, and all other applications for MBAFF patents were filed as divisional applications of that application. Trial Tr. __. Motorola has never asserted four of these patents, the '377, '025, '690, and '718 patents, against Microsoft's use of the H.264 standard in any U.S. court or in the International Trade Commission.

441. The MBAFF patents disclose, in combination with other features, performing adaptive frame/field coding on pairs of macroblocks ("paired macroblock MBAFF").

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Adaptive frame/field (AFF) coding is an interlaced coding technique that selects between frame and field coding for different portions of interlaced video, depending on which type of coding is more efficient for the particular video data being encoded. PX271 at col. 4, lns. 32-40, col. 6, lns. 45-63; Trial Tr. Before paired macro-blocks, two types of AFF were well known: (1) picture-level AFF (PICAFF) which decides between frame and field coding at the start of each picture but does not allow switching between field or frame mode within the picture; and (2) macroblock-level AFF (MBAFF) which decides between frame and field coding at the start of each macroblock (or pair of macroblocks or group of macroblocks) in the picture. Trial Tr. __.

442. The MBAFF patents apply only to encoding and decoding interlaced coded video. MBAFF is not suitable for progressively captured video or for video captured as interlaced that has been subsequently de-interlaced. Trial Tr. __. Even with interlaced coded video, AFF (including MBAFF) is often not used because the computational power requirements of the technique often outweigh the utility of the minor compression gains provided. Trial Tr. __. In some cases, video that purports to use MBAFF actually only uses one type of macroblock, *e.g.*, field coded macroblocks, instead of switching between the two modes. Because MBAFF is relevant only for interlaced content, MBAFF is not used for computer and internet applications. Trial Tr. __.

443. Choosing between frame and field coding at the macroblock level had been widely done for over a decade at the time of Motorola's filing of the original application in this family. Trial Tr. __; Puri, A., Aravind, R., and Haskell, B., "Adaptive frame/field motion compensated video coding", Signal Processing: Image Compression, vol. 5, no. 1-2, February 1993 ("the Puri article") (PX1669); MPEG-2/H.262 (PX617); 5,227,878 to Puri (the "'878 patent") (PX619); ITU Q.6/SG16 Document VCEG-N76, "Adaptive field/frame block coding experiment proposal", September 26, 2001 ("VCEG-N76") (PX788); VCEG-N57r2 (PX785).

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MBAFF performed at the level of single macroblocks had been implemented in prior video coding standards, including MPEG-2 and MPEG-4 part 2. Trial Tr. __.

444. Choosing between field and frame macroblocks at the single macroblock level, *i.e.*, single macroblock MBAFF, was an alternative to using paired macroblock MBAFF when H.264 was developed. Single macroblock MBAFF had been proposed and was available to the JVT. Trial Tr. __; *see*, *e.g.*, PX785, PX788; PX790; PX791.

445. None of Motorola's contribution documents directly compare the performance of paired macroblock MBAFF to single macroblock MBAFF. Trial Tr. __. Available test results, however, indirectly show that paired macroblock MBAFF does not provide any notable gain over single macroblock MBAFF. Trial Tr. __; PX659; PX791. The named inventors of the MBAFF patents compared the performance of single macroblock MBAFF to PICAFF. The inventors found that single macroblock MBAFF achieved 9.8% bitrate savings in the size of the encoded content (all else being equal) compared to PICAFF for a specific test video. Trial Tr. __; PX791. The named inventors of the MBAFF patents also compared the performance of paired macroblock MBAFF to PICAFF. The inventors found that paired macroblock MBAFF achieved bitrate 6% savings in the size of the encoded content (all else being equal) compared to PICAFF for the same video. Trial Tr. __; PX659. Accordingly, the paired macroblock MBAFF described in Motorola's MBAFF patents performed worse than single macroblock MBAFF and certainly does not provide notable savings in the size of the encoded content over single macroblock MBAFF. Trial Tr. __ PX791; PX659.

446. Motorola asserts that the practicing the H.264 Standard requires using claims 1 and 2 of the '596 patent. Motorola did not analyze any other claims from the '596 patent or the claims from the other MBAFF patents with respect to the H.264 Standard. Claims 1 and 2 of the '596 patent are method claims. Trial Tr. __.

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447. The Administrative Law Judge ("ALJ") at the International Trade Commission found that Microsoft's Xbox infringed Motorola's '596 patent solely based on Microsoft's H.264 testing to ensure that its decoder could properly decode H.264 encoded content. *See* PX428 at pp. 115-116, 172. The Commission has remanded that decision back to the ALJ because such testing is not sufficient to find a violation. *See* PX1665. The ALJ did not find any evidence that customers actually use the Xbox to play MBAFF-encoded or interlaced video content. PX428 at pp. 129-130, 187. Motorola has offered no evidence that Microsoft products are used to decode and play paired macroblock MBAFF, let alone that such use is common. The ALJ did not make any finding relating to the importance of the '596 patent or how often an Xbox might perform the accused processing, merely that it was capable of infringing. There is no evidence showing that Microsoft's customers perform the methods of claims 1 and 2 of the '596 patent. Trial Tr. __.

448. The International Trade Commission, in the 337-TA-752 Investigation, found claim 1 of the '596 patent to be invalid. PX428 at pp. 188-91. Claim 1 of the '596 patent requires applying MBAFF at the level of "a group of neighboring macroblocks." *See* PX271 at cl. 1; PX428 at p. 189. The ALJ construed the claim term "macroblock" to mean "a rectangular group of pixels." PX428 at pp. 154-157. This is the same construction for the term "macroblock" this Court adopted in the present litigation. *See* PX1509. Applying this construction of macroblock, the ALJ concluded that prior art disclosing single macroblock MBAFF on 16x16 pixel regions anticipated claim 1 because the 16x16 pixel regions could be viewed as "groups" of 8x8 or 16x8 macroblocks, as the claim required. PX428 at pp. 188-91. The prior art that the ALJ found anticipated claim 1 included an MPEG-4 draft specification, documents describing MPEG-2, and a JVT contribution document submitted in connection with H.264's development. PX428 at pp. 188-91 (citing MPEG-4 Part 2 Standard, *Information Technology – Coding of Audio-Visual Objects: Visual*, ISO/IEC 1446-2 Committee Draft,

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March 1998 (PX1671), U.S. Patent number 5,227,878 (PX619); and VCEG-N76 (PX788)). That the MBAFF patents' claims read on the previously known single macroblock MBAFF raises serious questions about their validity and whether there is anything inventive about their claims. Trial Tr. __.

449. Dependent claim 2 of the '596 patent adds the limitation that macroblocks are divided into block sizes of 16x16, 16x8, 8x16, 8x8, 8x4, 4x8, or 4x4. Those seven block sizes were submitted for inclusion in H.264 by other companies to the JVT in contribution documents that predate the '596 patent's priority date. Trial Tr. __; PX752. In these claims, Motorola has combined these existing block sizes with MBAFF, raising serious questions about any incremental value of claim 2. Trial Tr. __.

450. The ALJ found claim 2 of the '596 patent not to be invalid. In reaching this conclusion, the ALJ construed the term "can be divided into blocks, each of said block comprises 16x16, 16 by 8 pixels, 8 by 16 pixels, 8 by 8 pixels, 8 by 4 pixels, 4 by 8 pixels, or 4 by 4 pixels" to mean that all listed block sizes had to be possible. PX428 at p. 170. Microsoft had contended that "or," as recited in the claim term, required that any one or more of the block sizes needed to be possible. PX428 at p. 170. The ALJ determined claim 2 was valid by applying Motorola's construction and requiring all such block sizes. PX428 at p. 191. The ALJ's reasoning would not have applied under Microsoft's construction. Given that in ordinary English the term "or" refers to one or more items in a list, not all the items in a list, there are serious questions about this claim's validity in view of the prior art. Trial Tr. __.

451. Motorola's other patents in the MBAFF family are similar to the '596 patent. These patents claim the same use of MBAFF as the '596 patent but each combines using MBAFF with other techniques also well known in the prior art. The combination of the already known MBAFF with other known video encoding techniques raises a serious question about any incremental value of those patents. Trial Tr. __.

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452. In particular, the '374 patent is directed to MBAFF in combination with inter coding. Inter coding has been known since at least the time of MPEG-1. Trial Tr. __; PX585 at p. 156. MPEG-1 was published in 1993. PX585 at p. 152. The '375 patent is directed to using MBAFF in combination with intra coding. H.264's intra coding was described in contribution documents pre-dating this patent's priority date. Trial Tr. __; PX783. The '376 patent is directed to using MBAFF in combination with a horizontal or vertical scanning path when sequencing macroblock pairs for processing. The use of horizontal or vertical scanning paths for this purpose has been in the prior art since at least MPEG-1. Trial Tr. __; PX585 at p. 155. MPEG-1 was published in 1993. PX585 at p. 152. The '377 patent is directed to using MBAFF with frames in which some portions are inter-coded and some portions are intra-coded. The use of pictures having both inter coded and intra coded portions has been known since at least MPEG-2. Trial Tr. __; PX572 at p. 166. MPEG-2 was standardized in 1995. PX585 at p. 172. The '025 patent is directed to adaptive frame/field coding at the level of groups of macroblocks having multiples of two. H.264 implements adaptive frame/field coding at the level of pairs of macroblocks and not any other multiple of two. PX421at p. 25. As explained previously, the prior art disclosed adaptive frame/field coding of two macroblocks. Trial Tr. __; PX1507; PX1671 (MPEG-4 committee draft). The '690 patent is directed to the combination of MBAFF with skipped macroblocks. The use of skipped macroblocks has been known since at least MPEG-2. Trial Tr. __; PX572. MPEG-2 was standardized in 1995. Trial Tr. __; PX585 at p. 172. The '718 patent is directed to the combination of MBAFF with the use of two motion vectors for blocks in bi-predicted pictures. The use of two motion vectors for blocks in bi-predicted pictures has been known since at least MPEG-2. Trial Tr. __; PX572 at pp. 150-51. MPEG-2 was standardized in 1995. Trial Tr. __; PX585 at p. 172.

4. The Wang "PICAFF patents"

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453. The PICAFF patents include U.S. Patent No. 7,769,087 (" '087 patent), 7,660,353 (" '353 patent"), and 7,839,931 (" '931 patent"). The PICAFF patents' earliest priority date is November 27, 2001. Motorola has never asserted these patents against Microsoft's use of the H.264 standard in any U.S. court or in the International Trade Commission. Trial Tr. __.

454. Picture Adaptive Frame/Field ("PICAFF") coding is a video compression technique for efficiently compressing interlaced captured video. For each picture in a video clip, the encoder chooses between using "field" coding and "frame" coding, depending on which coding format is better suited for that particular picture. PX271 at col. 4, lns. 32-40, col. 6, lns. 45-63; Trial Tr. __. For field coding, the picture is divided into two "fields," one containing all the odd lines of the picture and one containing all the even lines of the picture, and then each field is encoded separately. Field coding is more efficient for interlaced video with a lot of motion. Frame coding does not divide the even and odd lines of the pictures, encoding even and odd lines together. Frame coding is more efficient for interlaced video without a lot of motion and is also used for progressive video. Because it can vary the coding on a picture-by-picture basis, PICAFF can provide better compression than using solely frame coding or field coding for every picture. Trial Tr. __.

455. The PICAFF patents apply only to decoding interlaced encoded video. Trial Tr. __. The claims of the PICAFF patents are each limited to video that contains "field cod[ed]" pictures. PICAFF is not used for progressively encoded video, and not using PICAFF provides better compression for progressively encoded video. Trial Tr. __.

456. PICAFF was known before the earliest filing date of Motorola's PICAFF patents, November 27, 2001. Trial Tr. __. Motorola's Wang MBAFF patents acknowledge that. Trial Tr. __. PICAFF was also used in coding standards prior to Motorola's PICAFF patents. Trial Tr. __; PX1507 at vi, published at least as early as 1995. The PICAFF patents

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therefore include claims directed to PICAFF) combined with other video coding features. Trial Tr. __.

457. When the JVT was creating the H.264 standard, single macroblock MBAFF was an available alternative to PICAFF. Trial Tr. __; *see, e.g.*, PX785, PX788. Single macroblock MBAFF offers provides better coding than PICAFF, resulting in smaller encoded video. Trial Tr. __; PX791. Another alternative available to the JVT was to implement PICAFF in the same way it was implemented in MPEG-2. Trial Tr. __.

458. Serious questions exist about the validity and any incremental value of the Motorola PICAFF patents because these patents combine the known PICAFF coding technique with other known coding tools. PICAFF was a known interlaced coding tool at the time of the invention of the PICAFF patents. Trial Tr. __; PX1507. The PICAFF patents combine PICAFF with other known compression tools that were already present in the draft H.264 standard when PICAFF was added to the draft standard. Trial Tr. __. One of skill in the art would be motivated to combine a known interlaced coding tool like PICAFF with existing H.264 coding tools at the time of the invention of the PICAFF patents. Trial Tr. __; PX788; PX790. The combination of the already known PICAFF with other known video encoding tools raises a serious question about the validity of the PICAFF patents and the value of those patents.

459. Motorola asserted that practicing the H.264 Standard requires using claim 9 of the ‘087 patent, claim 7 of the ‘353 patent, and claim 1 of the ‘931 patent. Motorola has not analyzed any other claims of these patents with respect to the H.264 standard.

460. The ‘087 patent is directed to PICAFF in combination with a picture having two motion vectors, where both motion vectors can point in the forward or the backward direction. A two motion vector technique, with both vectors pointing in the forward or the backward direction, was implemented in H.264 as a result of non-Motorola contributions before the

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priority date of the '087 patent. Trial Tr. __; PX416 at MOTM_WASH1823_0603551. Serious questions therefore exist about the obviousness of this patent.

461. The '353 patent is directed to PICAFF in combination with bi-predicted pictures having two motion vectors, with the second motion vectors being encoded as an offset of the first. Using two motion vectors, with the second motion vectors being encoded as an offset of the first, was disclosed in earlier JVT submissions. PX695, PX657. Serious questions therefore exist about the obviousness of this patent. Trial Tr. __.

462. The '931 patent is directed to PICAFF in combination with reference pictures that are indexed. Indexing reference pictures was published in earlier JVT submissions. PX688. Serious questions therefore exist about the obviousness of this patent. Trial Tr. __.

5. The Wang "alternate scan patents"

463. The "alternate scan patents" include U.S. Patent Nos. 7,162,094 (" '094 patent") and 6,987,888 (" '888 patent"). The '094 patent claims a priority date of November 27, 2001. The '888 patent claims a priority date of November 20, 2002. Motorola has never asserted the '888 patent against Microsoft's use of the H.264 standard in any court or in the International Trade Commission. Trial Tr. __.

464. The '094 patent is directed to a 4x4 field scan path for interlaced content, and the '888 patent is directed to an 8x8 field scan path for interlaced content. Trial Tr. __. Transform coding results in a two dimensional group of values that represent a two dimensional section of the picture. A scan path selects where to place the values from this two dimensional group of values in a one dimensional list, thereby controlling where each value appears in the one dimensional list. Trial Tr. __. An efficient scan path results in better compression by grouping zeros together in the one dimensional list. Trial Tr. __.

465. Zigzag scan paths were known in the prior art and were used in prior video coding standards such as MPEG-2. Trial Tr. __. It was known prior to the '094 and '888

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patents that zigzag scan paths provide better compression for progressively coded video than for interlaced coded video. Trial Tr. __. It was also known prior to the '094 and '888 patents that interlaced coded video has different characteristics than progressively coded video and that using a vertically biased coefficient scan path for interlaced video results in better compression than using a zigzag scan path. Trial Tr. __; *see* CX678, Fairfax, May 2002.) The '094 and '888 patents each disclose and claim a specific vertically biased scan path for use in interlaced video coding. The '094 and '888 patents apply only to interlaced video. Trial Tr. __.

466. Motorola asserted claim 7 of the '094 patent and claim 7 of the '888 patent against the field scan paths used for scanning transform coefficients in the H.264 Standard. Motorola has not analyzed any other claims of these patents with respect to the H.264 standard. The H.264 field scan is used only for interlaced coded video. Trial Tr. __; PX421 at § 8.5.6.

467. When the JVT was developing the H.264 standard, alternatives existed to the scan paths in the '094 and '888 patents. An alternative to the scan path claimed by the '094 patent was a 4x4 field scan path for interlaced content proposed by Sony during the H.264 development process. Trial Tr. __; PX656. Available test results show that the Sony scan path outperformed the scan path claimed in the '094 patent. Trial Tr. __; PX709; PX713; PX656. Motorola's submission of the scan path claimed by the '094 patent described the compression achieved by the '094 scan path as being "consistent" with the compression achieved by the Sony scan path described in JVT-B068. Trial Tr. __; PX678.

468. An alternative to the scan path claimed by the '888 patent was the 8x8 field scan path MPEG-2 used for interlaced content. Sony proposed this field scan to the JVT, and it was previously known from MPEG-2. Trial Tr. __; PX656. Prior to the '888 patent, the MPEG-2 alternate scan was known to provide good compression for interlaced video that used 8x8 transformations. Trial Tr. __. Motorola did not provide the JVT any documentation showing any performance gain by using its 8x8 field scan compared to either the zig-zag scan

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or to MPEG-2's alternate field scan. Trial Tr. __; PX678 (offering combined Adaptive Block Transform (ABT) test results for 4x4, 8x8, 4x8, and 8x4 scans). Sony's contribution shows that MPEG-2's alternate scan path results provides a 2.39% bitrate savings, on average, compared to the zig-zag scan, meaning that the resulting encoded video is on average 2.39% smaller than if zigzag had been used. PX656. These averages depend on the few specific videos tested and can vary widely depending on the characteristics of the test videos, making comparisons of the bitrates resulting from applying particular compression techniques to specific videos superficial at best. In addition, the bitrate savings for a few test videos cannot be compared to the overall bitrate improvement between H.264 and its predecessors because of the small number of tested videos and the likely bitrate variation between videos with different characteristics. Trial Tr. __.

469. The Administrative Law Judge ("ALJ") at the International Trade Commission found that Microsoft's Xbox infringed MMI's '094 patent solely based on Microsoft's H.264 testing to ensure that its decoder could properly decode H.264 encoded content. *See* PX428 at pp. 115-116, 172. The Commission has remanded that decision back to the ALJ because such testing is not sufficient to find a violation. *See* PX1665. The ALJ did not find any evidence that customers actually use the Xbox to play interlaced video content or that the Xbox ever uses the field scan in the '094 patent. PX428 at pp. 129-130, 187. The ALJ also did not find evidence that Microsoft contributed to or induced infringement of the '094 patent. PX428 at pp. 129-130.

6. U.S. Patent 6,005,980

470. U.S. Patent 6,005,980 (" '980 patent" or "Eifrig patent") claims earliest priority to March 7, 1997. Motorola has never asserted this patent against Microsoft's use of the H.264 standard in any court or in the International Trade Commission. Motorola has asserted that

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practicing the H.264 standard requires using claim 13 of the '980 patent. Motorola has not analyzed any other claims of the '980 patent with respect to the H.264 standard. Trial Tr. __.

471. The '980 patent relates to predicting the motion vector for a current block based on three specific, identified neighboring blocks – one neighbor immediately to the current block's left, one neighbor immediately above the current block, and one neighbor immediately to the current block's top-right – where at least one of the blocks is field coded. Trial Tr. __. Figure 7 of the patent shows these neighboring blocks (712, 722, 732) compared to current block (700):

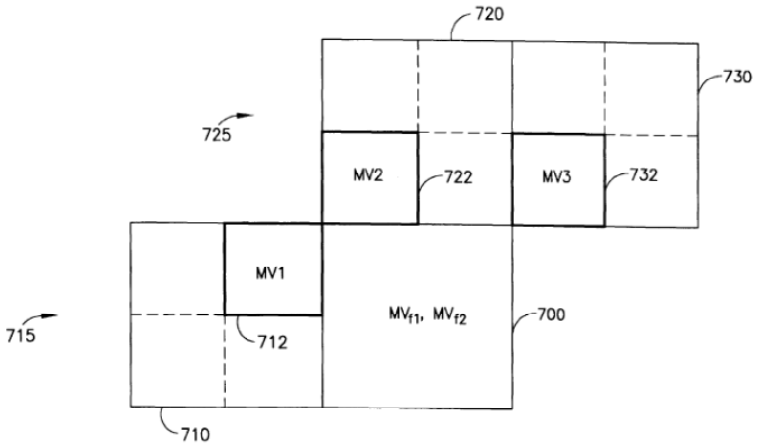

FIG.7

472. The '980 patent applies only to decoding of interlaced video. Trial Tr. __. The specification of the '980 patent explains that "the present invention relates to a method and apparatus for coding of digital video images such as video object planes (VOPs), and, in particular, to motion estimation and compensation techniques for *interlaced digital video*." PX268at 1:12-15; *see also id.* at cl. 13.

473. When the JVT was developing the H.264 standard, other alternatives were available to the technique Motorola asserts requires using the '980 patent. The H.264 standard could have used only two, instead of three, neighboring blocks to predict the motion vector for the current block. Trial Tr. __. Motorola has not identified test results showing any

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performance benefit that the three blocks Motorola identifies in the H.264 standard might offer over this alternative. Trial Tr. __. In addition, another alternative would have been to use a different three nearby blocks to predict the motion vector for the current block. Trial Tr. __. Motorola has not identified test results showing any performance benefit that the particular three blocks in the H.264 standard offer over this alternative. Trial Tr. __.

474. The video coding standard H.263, published May 2, 1996, described predicting motion vectors for a current block based on the same three, specific, neighboring blocks that are described in the '980 patent, albeit for progressively encoded video. PX613 at 6.1.1; Trial Tr. __. The '980 patent applies the same motion vector prediction technique described in the H.263 standard to coding interlaced video. Trial Tr. __. Interlaced video, including its potential use with H.263, was well known at the time the '980 patent was filed. Trial Tr. __. One of skill in the art would know to combine using the already known specific, neighboring blocks in H.263 with interlaced coding. This combination raises a serious question about the validity of the '980 patent and the value of that patent. Trial Tr. __.

475. The MPEG-4 Visual patent pool includes this patent at rates similar to the rates offered by MPEG-LA. PX1186.

476. Motorola did not submit to the JVT any contribution documents related to the subject matter it now alleges requires using the '980 patent. Trial Tr.__.

7. U.S. Patent 6,836,514

477. Motorola did not identify U.S. Patent 6,836,514 (" '514 patent" or "Gandhi patent") as essential to the H.264 standard in response to Microsoft's Interrogatory No. 16 and did not identify specifically where the H.264 standard allegedly practices any claim of the Gandhi patent. The Gandhi patent is not essential to the H.264 standard.

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478. '514 patent claims priority to July 10, 2001. Motorola has never asserted this patent against Microsoft's use of the H.264 patent in any court or in the International Trade Commission. The Gandhi patent is not essential to practicing the H.264 standard. Trial Tr. __.

479. The Gandhi patent relates to detecting errors in frame overhead fields and mitigating those errors by replacing corrupted information with improved information calculated using a formula. Trial Tr. __. The Gandhi patent discusses replacing errors in timestamp metadata but does not identify replacing any other data. *See* PX269 at 7:35-8:23.

480. Motorola did not submit to the JVT any contribution documents related to the subject matter it now alleges requires using the Gandhi patent. Trial Tr. __.

481. Motorola's expert has suggested that the Gandhi patent is essential to practicing the H.264 standard. Microsoft promulgated an interrogatory, Interrogatory No. 16, to Motorola asking Motorola to identify all patents that it asserts are standards essential. Motorola's response to Interrogatory No. 16 did not identify the Gandhi patent as essential to H.264. PX1297; Trial Tr. __.

482. Motorola has not explained how the Gandhi patent relates to the H.264 standard in sufficient detail to show that it is essential. Motorola identifies Annexes B and D to the H.264 Standard generally as practicing certain portions of claim 69. Trial Tr. __; PX421 at p. 322; PX576 at p. 248.) Motorola's allegations are too general to support a finding that Annexes B and D require using the Gandhi patent. The Gandhi patent not essential to practicing the H.264 standard. Trial Tr. __.

483. Claim 69 claims a technique for detecting errors and replacing the erroneous information using one or more formulae. The H.264 standard does not specify any particular manner for detecting or finding errors. PX421 at p. 39, ¶ 7.1. The H.264 standard does not instruct decoders to replace erroneous data with the result of a formula. Instead, H.264 decoders simply discard erroneous data. PX421 at p. 306. The H.264 standard does not

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practice the asserted claim, and therefore this patent is not essential to practice the H.264 standard. Trial Tr. __.

484. When the JVT was developing the H.264 standard, alternatives existed to the technology Motorola alleges requires using the Gandhi patent. At that time, there existed known video coding methods for error mitigation. Trial Tr. __; PX1520. An alternative to the technique claimed by the Gandhi patent would be to discard corrupted data, rather than using a formula to replace corrupted data with improved data. Indeed, this is what the H.264 standard, Annex D, specifies. Trial Tr. __; PX421 at p. 306. Another alternative to the Gandhi patent is to do error correction outside of the H.264 coding. For example, the distribution system, rather than the H.264 video coding layer, could handle error correction. Trial Tr. __; PX640 at §§6.1-6.4; PX630 at § 6.4.2.

D. Microsoft's Products

485. The Motorola patents have very limited value to Microsoft given Microsoft's use of the H.264 standard in its products. Trial Tr. __. Microsoft's computer software products and its Xbox product are generally not used to decode interlaced coded content and therefore Motorola's patents relating to interlaced coded content have little value to Microsoft. In addition, the two Motorola patents that are not limited to interlaced coded content have claims in means plus function format that are limited to a hardware implementation. Microsoft's products, when using a Microsoft provided decoder, use software to decode H.264 encoded content. Trial Tr. __.

1. Xbox 360s console ("Xbox")

486. Motorola's MBAFF patents, PICAFF patents, and Eifrig patent relate to interlaced encoded video only. Trial Tr. __ The H.264 functionality that Motorola asserts requires using these patent is rarely if ever used by users of the Xbox 360 because Xbox users will rarely, if ever, encounter content that uses the H.264 functionality that Motorola identifies.

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Motorola's interlaced related patents, therefore, provide little value to Microsoft for its Xbox console. Trial Tr. __.

487. Motorola's other two patents, the '968 patent and '419 patent, have means plus function elements that cover hardware encoders only. Xbox decodes in software. These patents therefore have no value to Microsoft for its Xbox console. Trial Tr. __.

488. Xbox video games do not use H.264. This is a major use of Xbox. Trial Tr. __; PX1508 at Q17, 20.

489. Xbox can also play video content. The primary manner by which users watch video content on Xbox is through Xbox Live. Trial Tr. __; PX1670. Xbox Live can display content encoded in H.264 as well as in formats, including MPEG-4 part 2 or VC-1. Trial Tr. PX943. All video content distributed through Xbox Live is progressive; Xbox Live distributed content is never interlaced. Trial Tr. __; PX288 at p. 21; PX1508 at Q21; PX1525 at 423:7-11; PX638 at p. 4.

490. Xbox includes a DVD drive. PX943. Commercial DVDs do not use H.264. Trial Tr. __; PX949 The Xbox does not support playing Blu-ray discs, which can use H.264. Trial Tr. __.

491. Xbox can process video files on homemade "burned" DVDs and on USB drives. Those files can be in any format – video or non-video, H.264 or non-H.264. There is no evidence of any actual use of this option to view interlaced encoded video content. Trial Tr. __.

492. Motorola has not shown that any Microsoft customer has ever watched interlaced encoded content on an Xbox or any content that uses the features Motorola asserts requires using the MBAFF patents, PICAFF patents, and Eifrig patent. Trial Tr. __.

493. U-verse is a paid television system offered by AT&T that completes with cable and satellite television. AT&T U-verse is available only in the United States. AT&T utilizes

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H.264 compression and provides U-verse content in both interlaced and progressive formats. AT&T offered a kit that allowed consumers to use an Xbox as a household's secondary set top box for the AT&T U-verse television service. PX1000. To receive U-verse content on an Xbox, an individual needed to be an AT&T customer and have a standard U-verse receiver because Xbox could not be a primary U-verse receiver. Trial Tr. __ ; PX1005.

494. AT&T introduced the Xbox-U-verse kit in October 2012 and removed that kit from the market at least as early as May 2012. PX1005. The kit to use an Xbox to receive and view U-verse content is not currently available. PX1000; Trial Tr. __. Only a trivial number of AT&T U-verse customers received the kit. Trial Tr. __.

495. Motorola itself manufacturers at least some of the encoders that AT&T uses to encode the video content distributed over the AT&T U-verse network. Trial Tr. __; PX1532. AT&T has a license, either through an express or implied license or through exhaustion, to transmit this encoded content to its customers. AT&T's customers are authorized to decode this content for the same reason. An AT&T customer therefore is authorized to practice Motorola's patents when using an Xbox to decode U-verse content that was encoded using a Motorola encoder. Trial Tr. __.

496. Motorola produced video file 03202009sa2.mpg as supposedly a sample of content provided by AT&T's U-verse service. Video file 03202009sa2.mpg has never been distributed by AT&T U-verse. Trial Tr. __. This video file has French and Chinese audio tracks but no English audio track. Trial Tr. __. In addition, video file 03202009sa2.mpg is not encoded in a resolution used by AT&T U-verse. Portions of the video content, for example logos in the corner, are clipped and not entirely visible in video. Trial Tr. __. Video file 03202009sa2.mpg also reflects television programming that was broadcast before AT&T U-verse was launched. Trial Tr. __. Video file 03202009sa2.mpg is not representative of the video distributed by AT&T U-verse. Trial Tr. __.

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497. The Xbox 360 does not currently have the ability to access content over the Internet other than through Xbox Live. Trial Tr. __.

498. The Xbox 360 does not include an H.264 encoder. Trial Tr. __. Motorola encoder-related patents have no value to Microsoft for the Xbox 360. Trial Tr. __.

2. Windows desktop operating systems

499. Computing devices such as desktop computers and laptop computers use progressive displays. PX572 at pp. 1-2; Trial Tr. __. Because the displays used with computing devices are inherently progressive, decoding interlaced video is not a significant use of Windows software. Motorola's interlaced related patents, therefore, provide little value to Microsoft for its Windows software. Trial Tr. __.

500. The two of Motorola's patents that are not limited to interlace coded video still are not implicated by Microsoft's provision of a H.264 decoder in Windows because their means plus function claim elements require decoding in hardware rather than software. Microsoft's Windows software, to the extent it uses Microsoft's decoder, decodes in software. These patents therefore provide no value to Microsoft. Trial Tr. __.

501. A modern operating system provides both internal features and user-facing features. Trial Tr. __. Internal features include scheduling among applications, mediation between hardware and software, and system security and stability. These features do not involve video coding. Trial Tr. __. User-facing features are extremely large in number and the vast majority do not involve video coding. PX1006; Trial Tr. __.

502. A computer running Microsoft windows supports many video formats aside from H.264, including MPEG-2, MPEG-4 part 2, and WMV, depending on the version of Windows used and what third-party software is installed. PX1531; Trial Tr. __.

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503. Recent versions of Microsoft Windows, including Windows 7 and certain versions of Windows Vista since February 2011, include H.264 functionality and are compliant with the H.264 standard. PX941; PX970; Trial Tr. __.

504. There are three main sources of video on a modern personal computer: the Internet, playback of commercial DVDs or Blu-ray discs, and user-generated content. Trial Tr. __ None of these sources provide any reason for Microsoft to value Motorola's patents highly.

505. Internet video providers use progressive video. PX589 (listing progressive formats for video services from Amazon, Netflix, Hulu, and iTunes). Nearly no interlaced H.264 content is available on the Internet, and commercially relevant Internet websites do not distribute interlaced video. Trial Tr. __ Several popular websites that distribute video over the Internet expressly prohibit interlaced content, including YouTube, which represents up to 40% of the World Wide Web's video content. PX285; PX989. Microsoft's Silverlight, which also allows video streaming over the Internet, does not support interlaced content. PX607. Similarly, Vimeo, another popular Internet video streaming service, discourages interlaced content. PX990

506. Interlaced captured video is converted to progressive format before use on the Internet or on computers. *See, e.g.*, PX608; PX605; PX285. Once the previously interlaced video has been converted into progressive format, the resulting video is in progressive format and is coded as progressive, not interlaced, video. Trial Tr. __.

507. Motorola identified five examples of alleged interlaced video content sourced from the Internet. Two of those examples do not utilize interlaced video at all. And the other three sources are not commercially significant to Microsoft. Motorola's first example ("the Katy Perry video") was a video that was not originally sourced from the Internet but pirated from British television and placed onto an illegal file sharing website. PX988; Trial Tr. __. Motorola's second example ("French video clip") was a two-second video clip that resided on

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a French website for testing purposes, and that was also originally sourced from television. Trial Tr. __. Motorola's third example was a video file created by the JVT for H.264 conformance testing and resides in JVT archives. Trial Tr. __. These three files are not commercial significant to Microsoft. Motorola's fourth example was a video of the 2012 Olympics. Trial Tr. __. That video, however, was not transmitted over the Internet in interlaced form and instead was distributed as progressively encoded video. Trial Tr. __. Motorola's fifth example was a set of NASA videos that were not encoded using H.264. Trial Tr. __.

508. Another source of video content on a modern personal computer is a commercial disc in the DVD or Blu-ray format. Standard DVD video disks use MPEG-2 or MPEG-1 coding, not H.264. *See, e.g.*, PX1519; Trial Tr. __. Microsoft does not provide software that allows a computer to play Blu-ray discs. Blu-ray support on Windows computers comes from third-party software not provided by Microsoft, often installed by the computer manufacturer. PX998; Trial Tr. __.

509. Another source of video content is generated by computer users. User-generated content can come in any form – video or non-video, H.264 or non-H.264, though such content will need to conform to the requirements of the content platform on which it is played. Trial Tr. __. Microsoft does not control the format in which users encode content. Encoding video is not a significant use of Windows software. Watching video involves decoding, not encoding. Trial Tr. __. In addition, Microsoft Windows' H.264 encoder does not encode video in interlaced format or use field coding. Trial Tr. __; PX1504.

510. In addition to these more common sources of video on a modern computer, a fringe use of a modern computer is to watch broadcast television. Trial Tr. __ There are no commercially relevant situations in the United States in which a consumer's computer will decode H.264 content from a television broadcast. Over-the-air digital television broadcasting

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in the United States does not use H.264 (instead using MPEG-2). PX630. Microsoft's Windows operating system does not natively have the ability to receive broadcast television. In some cases, a television broadcast would be decoded by another device, such as a cable box or other tuner, before entering the computer, which may change the video format. PX1514. Microsoft does not supply products in the television broadcasting market. Trial Tr. __.

511. A modern personal computer also does not generally, or even often, use its Microsoft's supplied Windows H.264 software decoder to decode H.264 encoded content. Some third-party applications use their own H.264 video decoders instead of the decoder supported by the operating system software. One common application that supplies its own decoder and which does not use Microsoft's decoder is Adobe's flash player. PX1001; Trial Tr. __. Video accessed through the Internet is very often in Adobe Flash format and therefore decoded by Adobe Flash rather than Windows. PX609; PX588; Trial Tr. __. In addition, Apple's Quicktime software (while running on Windows) uses its own software decoder to decode H.264 encoded content. Trial Tr. __.

512. Even when third party software is not used to decode H.264 encoded content, Microsoft's operating system software still may not, depending on the computer hardware, perform the H.264 functionality that Motorola asserts requires using its patents. Microsoft desktop operating systems, including Windows Vista, Windows 7, and Windows 8, use a portion of the operating system called DirectX to decode H.264 encoded content. PX1528; PX966); PX1510; PX997; Trial Tr. __. When a computer has the appropriate hardware, DirectX asks the computer's hardware to decode H.264 encoded video, instead of decoding it in software, because hardware decoders are more efficient than software decoders. PX996; PX587; Trial Tr. __ Most modern computers have hardware decoders, resulting in the hardware decoder, not operating system software, performing the H.264 functionality that Motorola asserts requires using its patents. Trial Tr. __.

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513. Microsoft does not create or supply hardware decoders. Trial Tr. __. The computer manufacturer decides whether to include a hardware decoder on a computer. The hardware decoder performs the functionality Motorola asserts requires using its patents, not Microsoft's software decoder. Trial Tr. __.

3. Windows Phone 7 (and 7.5)

514. Windows Phone provides both internal features and user-facing features. Internal features do not involve video decoding and include scheduling among applications, mediation between hardware and software, and system security and stability. User-facing features are extremely large in number and the vast majority do not involve video decoding. PX1006; PX1007; Trial Tr. __.

515. Devices running Windows Phone are manufactured by third parties who include non-Microsoft hardware to decode H.264. Microsoft does not create or supply hardware decoders, and the Windows Phone operating system software does not decode H.264 video content. PX942; Trial Tr. __.

516. Microsoft advises content providers to encode video for Windows Phone devices using settings that allows only progressive frame coding. PX942; Trial Tr. __.

4. Windows Embedded

517. Windows Embedded is used for highly specialized devices, the vast majority of which do not perform video decoding. PX1516; Trial Tr. __.

518. Motorola's only example of a Windows Embedded device performing video decoding uses third party decoding hardware rather than Microsoft's operating system software. PX1517; Trial Tr. __.

5. Silverlight

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519. Microsoft's Silverlight product supports many video formats in addition to H.264, including uncompressed video, Windows Media videos, and MPEG-4 Part 2. PX607; Trial Tr. __.

520. Silverlight does not support interlaced video. PX607; Trial Tr. __.

6. Zune for Windows and Expression

521. Microsoft's Zune devices supported many video formats aside from H.264, including WMV and MPEG-4 part 2. At least one Zune model did not support H.264 at all. PX643; Trial Tr. __.

522. Zune devices did not support interlaced video content. PX643; Trial Tr. __.

523. Zune-related software that ran on a personal computer supported interlaced video content only in order to convert that video into progressive form for use on Zune devices. PX643; Trial Tr. __.

7. Skype

524. Microsoft's Skype product does not support interlaced video. Trial Tr. __.

8. Lync

525. Microsoft's Lync product supports many functions unrelated to video coding, including instant messaging, audio conferencing, and telephone calls. Trial Tr. __.

526. With respect to video functions, including video conferencing, Lync does not support interlaced video. PX644 at p. 6; Trial Tr. __.

E. Survey evidence

527. Dr. Sukumar's surveys do not show the extent to which their results apply to H.264 video or H.264 interlaced video. Trial Tr. __.

528. Dr. Sukumar's survey asked participants to indicate whether they use an Xbox to watch MBAFF-encoded video content. A lay, or typical non-expert, Xbox user would not know or be able to determine whether the video he or she was watching on an Xbox was

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MBAFF-encoded. Luthra Dep. at 26-28; Trial Tr. __. A lay Xbox user would not know what MBAFF is. Luthra Dep. at 26- 27:; Trial Tr. __.

529. Determining whether video is MBAFF-encoded requires the use of specialized software packages that lay Xbox users do not purchase or use. PX1008; Luthra Dep. at 26-28; Trial Tr. __. Indeed, the Elecard software that Motorola's expert used does not work on Xbox. Trial Tr. __.

530. Dr. Sukumar's survey asked participants to indicate whether they use an Xbox to watch interlaced video content. A lay Xbox user would not know or be able to determine that he or she was watching interlaced encoded video. Luthra Dep. at 26-28; Trial Tr. __. A lay user of Xbox would not know what interlaced video is. Luthra Dep. at 27-27; Trial Tr. __.

531. Participants in Dr. Sukumar's survey provided self-contradictory responses as to their consumption of progressive, interlaced, and MBAFF-encoded content. Trial Tr. __.

532. Xbox does not indicate whether video is interlaced encoded or MBAFF encoded. Trial Tr. __.

F. Microsoft's patents

533. Microsoft is a participant in the MPEG LA H.264 patent pool. Trial Tr. __.

534. As of July 2012, Microsoft's patents in the pool include 36 U.S patents as well as patents in Japan, Korea, China, and Europe. The European patents are registered in at least Germany, France and the United Kingdom. In some cases, the European patents are registered in many more states. Trial Tr. __.

535. Aside from geographic coverage, the Microsoft patents in the MPEG LA patent pool cover a wide range of coding and decoding tools of the H.264 standard. Trial Tr. __ ; PX1575.

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536. Most of the Microsoft patents in the MPEG LA patent pool include claims that relate to the Main and High profiles of the H.264 standard. Over two-thirds of the patents include claims that also relate to the Baseline profile of the H.264 standard. Trial Tr. __.

537. Microsoft owns 40 U.S. Patents essential to the H.264 standard. PX1575; Trial Tr. __.

538. In addition to granted patents, Microsoft has scores of pending patent applications with claims that should be deemed essential to the H.264 standard when patents are granted for those applications. Trial Tr. __. Often, these pending applications have direct counterparts in other countries for which patents have been granted with standard-essential claims, although the pending applications have not yet entered active prosecution. Trial Tr. __.

1. Microsoft's Transform Patents

539. Microsoft has a large family of patents that are directed to features of 4x4 frequency transforms, 4x4 inverse frequency transforms, quantization/scaling operations and inverse quantization / scaling operations. Trial Tr. __. Transform, quantization, and scaling are core components of H.264 coding. Trial Tr. __.

540. Microsoft's transform family of patents includes multiple U.S. patents, multiple Japanese patents, multiple Chinese patents and multiple Korean patents, in addition to multiple pending applications in Europe. As of July 2012, the family includes U.S. Patent Nos. 6882685, 7106797, 7773671, 7839928, 7881371, Chinese Patent Nos. ZL02143205.8, 200510119219.4, 100463522, 100459712, German Utility Model No. 20222025.7, Japanese Patent Nos. 3964765, 3964925, 4560027, 4560028, 4560033, Korean Patent Nos. 839308, 839309, 839310, 839311, Taiwanese Patent No. I221388, European Patent Application Nos. 02019057.5, 06020298.3, 06020297.5, 06020296.7 (each to be registered in European countries and Hong Kong), U.S. Patent Application No. 13/009755. Trial Tr. __.

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541. The 4x4 inverse transform covered by Microsoft's transform family is a key feature of H.264 compression in most H.264 scenarios, including scenarios that use the Baseline, Main, and High profiles. Trial Tr. __.

542. MPEG LA has independently evaluated Microsoft's transform patents and has confirmed that they are essential to practicing the H.264 standard. Trial Tr. __. Other than the Microsoft patents, the MPEG LA pool includes few patents that cover the 4x4 inverse transform. Trial Tr. __.

543. Microsoft transform patents provide value over the alternatives available at the time the H.264 standard was adopted. Trial Tr. __.

2. Microsoft's Spatial Extrapolation Patents

544. The H.264 standard specifies different modes for spatial extrapolation, for example, extrapolation from different directions such as bottom-left, left, top-left, top or top-right into the given block. Trial Tr. __.

545. Microsoft has several families of patents that describe various features of spatial extrapolation in video coding and decoding. The patents in question are U.S. patents, and include U.S. Patent Nos. 7,116,830, 7,162,091, 7,181,072, 7,263,232, 7,577,305. Trial Tr. __.

546. The claims in some of these patents cover features of special case handling for a "DC" spatial prediction mode in the H.264 standard. Other patents claim available spatial extrapolation modes in the H.264 standard or decoding of spatial extrapolation modes as specified in the H.264 standard. Trial Tr. __.

547. Microsoft's spatial extrapolation family covers a key feature of H.264 compression in applications that use the Baseline, Main, and High profiles. Trial Tr. __.

548. MPEG LA has independently evaluated Microsoft's spatial extrapolation patents and has determined that they are essential to practicing the H.264 standard. PX977; Trial Tr. __.

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549. Microsoft spatial extrapolation patents provide value over the alternatives available at the time the H.264 standard was adopted. Trial Tr. __.

3. Microsoft's Weighted Prediction Patents

550. Weighted prediction makes it more likely that values in the coding process will be zero or close to zero, which typically helps compression efficiency. Trial Tr. __.

551. The H.264 standard supports weighted prediction in the Main and High profiles.

552. Microsoft has patents related to various aspects of weighted prediction. In some patents, a claim covers the way parameters for weighted prediction are signaled in the H.264 standard. In other patents, a claim covers aspects of weighted prediction when multiple reference picture are available, which is a feature supported in the H.264 standard. Trial Tr. __.

553. Microsoft's weighted prediction family includes patents in the U.S., Japan, China and Korea, as well as pending applications in Europe. As of July 2012, the family includes: U.S. Patent No. 7,609,767; Chinese Patent Nos. ZL03124169.7, ZL200610141384.4; Japanese Patent Nos. 102841, 4159400; Korean Patent No. 578432; European Patent Application Nos. 03008704.3, 06022642.0 (each to be registered in European countries and Hong Kong); U.S. Patent Application No. 11/838758. Trial Tr. __.

554. MPEG LA has independently evaluated Microsoft's weighted prediction patents and has confirmed that they are essential to practicing the H.264 standard. Trial Tr. __.

555. Microsoft's weighted prediction family covers a key feature of H.264 compression in applications that use the Main, and High profiles. PX977; Trial Tr. __.

556. Microsoft weighted prediction patents provide value over the alternatives available at the time the H.264 standard was adopted. Trial Tr. __.

4. Microsoft's Direct Mode Patents

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557. A feature of the H.264 standard allows (for the Main and High profiles) an encoder and decoder to switch between temporal prediction and spatial prediction for motion vectors of direct mode macroblocks. The H.264 standard also details operations used for spatial prediction of motion vectors for direct mode macroblocks, including handling of special cases and situations in which different neighboring macroblocks use different reference pictures for motion compensation. Trial Tr. __.

558. Microsoft has several families of patents with claims that relate to features of processing for direct mode macroblocks. Some patents have claims that generally cover spatial prediction for motion vectors of direct mode macroblocks according to the H.264 standard. Other patents have some claims that more specifically cover the way decisions between spatial prediction and temporal prediction for direct mode macroblocks are signaled according to the H.264 standard. Still other patents include some claims that cover special case handling for direct mode macroblocks in the H.264 standard. Trial Tr. __.

559. Microsoft's direct mode families include patents in the U.S., Japan, Korea and China, as well as pending applications in Europe, Brazil and other countries. Trial Tr. __ As of July 2012, the families include: U.S. Patent Nos. 7,003,035, 7,280,700, 7,646,810; Australian Patent No. 2003204477; Chinese Patent Nos. 03141275.0, 100394447; Japanese Patent Nos. 4522658, 4662697, 4733341; Korean Patent Nos. 939855, 958499, 965703; Mexican Patent No. PA/a/2003/004906; Russian Patent No. 2310231; Brazilian Patent Application Nos. PI03019926, PI03021645; Canadian Patent Application No. 2430460; European Patent Application Nos. 03000608.4, 03011935.8, 03013967.9, 10012820.6 (each to be registered in European countries; at least one to be registered in Hong Kong); Indian Patent Application No. 731/DEL/2003; U.S. Patent Application Nos. 11/465938, 11/525059, 12/474821. Trial Tr. __.

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560. H.264's Direct Prediction mode technique includes a "motion projection" submode and a "spatial motion vector prediction" submode. Trial Tr. __.

561. MPEG LA has independently evaluated Microsoft's direct mode patents and has confirmed that they are essential to practicing the H.264 standard. PX977; Trial Tr. __.

562. Microsoft's patents cover direct mode, which is a key feature of H.264 compression when applications use the Main, and High profiles. Trial Tr. __.

563. Microsoft direct mode patents provide value over the alternatives available at the time the H.264 standard was adopted. Trial Tr. __.

5. Microsoft's Deblocking Patents

564. By adaptively smoothing boundary discontinuities in reference pictures, deblocking in H.264 provides more accurate motion-compensated prediction values (that is, prediction values closer to the original pixel values). Trial Tr. __.

565. The H.264 standard specifies in-loop deblock filtering for the Baseline, Main and High profiles of the H.264 standard. Trial Tr. __. Microsoft's U.S. Patent 7,120,197 covers H.264 deblocking. Trial Tr. __. The deblocking features covered by Microsoft's patents is a key feature of H.264 compression in applications that use the Baseline, Main, and High profiles. Trial Tr. __.

566. MPEG LA has independently evaluated Microsoft's deblocking patents and has confirmed that they are essential to practicing the H.264 standard. PX977; Trial Tr. __.

567. Microsoft deblocking patent provide value over the alternatives available at the time the H.264 standard was adopted. Trial Tr. __.

6. Microsoft's Decision Signaling Patents

568. Collectively, the signaling of information about coding decisions consumes a significant fraction of overall bitrate for encoded video. Trial Tr. __. The H.264 standard specifies a syntax for the encoder to signal various decision information such as motion

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compensation block size, transform block size, coded block pattern (CBP), and skipped macroblock information. This syntax enables more efficient compression. Trial Tr. __.

569. Microsoft has several families of patents that relate to signaling decision information. One large family includes patents that describe variations of coding and decoding of coded block pattern information. A coded block pattern specifies which blocks of pixels contain non-zero coefficients. Other patents claim features of coding coded block pattern information jointly with macroblock mode information according to the Baseline, Main and High profiles of the H.264 standard. This family includes multiple U.S. patents, multiple Japanese patents and multiple European patents, which have been registered in Germany, France and the United Kingdom among other countries. Trial Tr. __.

570. As of July 2012, Microsoft's decision signaling family includes: U.S. Patent Nos. 6,563,953, 6,735,345, 7,289,673; European Patent No. 1135934 (registered in Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Italy, the Netherlands, Portugal, Spain, Sweden and Switzerland); European Patent No. 1853069 (registered in Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Italy, the Netherlands, Portugal, Spain, Sweden and Switzerland; registered in Hong Kong); Japanese Patent Nos. 4558827, 4625411; U.S. Patent Application No. 11/903222. Trial Tr. __.

571. MPEG LA has independently evaluated Microsoft's decision signaling patents and has confirmed that they are essential to practicing the H.264 standard. PX977; Trial Tr. __.

572. Microsoft's patents cover decision signaling features that are a key feature of H.264 compression in applications that use the Baseline, Main, and High profiles. Trial Tr. __.

573. Microsoft decision signaling patents provide value over the alternatives available at the time the H.264 standard was adopted. Trial Tr. __.

7. Microsoft's Byte Stream Patents

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574. From time to time, a decoder will encounter a bit error (e.g., due to a network transmission problem) or otherwise lose its position in parsing the incoming bitstream. Start codes are one way for a decoder to find its place in the incoming bitstream. A system that uses start codes to remedy that problem typically seeks to prevent or remedy start code emulation (i.e., using the start code for another purpose), which otherwise could disrupt playback. The H.264 standard defines start codes as well as a protocol for preventing start code emulation. Trial Tr. __.

575. Compared to prior approaches (which involved screening possible combinations of syntax elements to confirm that start code emulation could not happen), the start code emulation prevention in the H.264 standard is conceptually simpler and easier to implement. Trial Tr. __.

576. Microsoft has two large families of patents with claims directed to features such as start code emulation prevention, use of stuffing bits, and recovery of byte alignment. Some patents generally claim processing to remove start code emulation prevention bytes in the H.264 standard. Other patents claim stuffing bits and stuffing bytes in the H.264 standard, so as to facilitate start code emulation prevention. Still other patents claim operations for byte alignment recovery in the H.264 standard, where start code emulation prevention has been performed. Trial Tr. __.

577. As of July 2012, Microsoft's byte stream families include: U.S. Patent Nos. 7,248,740, 7,505,485, 7,839,895; Chinese Patent No. 03811662.6; European Patent No. 1468567 (registered in France, Germany, Great Britain, and Italy; registered in Hong Kong); European Patent No. 1753244 (registered in Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Greece Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, Switzerland and Turkey; registered in Hong Kong; Japanese Patent Nos. 4448334, 4703114, 4918119; Korean Patent No. 0895932; Taiwanese Patent No. I310137; European Patent

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Application No. 03728448.6 (to be registered in European countries and Hong Kong); Indian Patent Application No. 1816/DELNP/2004; Japanese Patent Application Nos. 2011-105462, 2012-084329. Trial Tr. __.

578. MPEG LA has independently evaluated Microsoft's byte stream patents and has confirmed that they are essential to practicing the H.264 standard. PX977; Trial Tr. __.

579. Microsoft's patents cover these byte stream features, which is a key feature of all profiles of the H.264 standard. Trial Tr. __.

580. Microsoft byte stream patents provide value over the alternatives available at the time the H.264 standard was adopted. Trial Tr. __.

8. Microsoft's Reference Decoder Patents

581. The H.264 standard specifies a bitstream syntax for signaling of the Hypothetical Reference Decoder ("HRD") parameters and describes operations in which the HRD parameters are used to evaluate bitstreams and decoders for conformance. A bitstream can include multiple sets of HRD parameters that define different ways to allocate resources (such as peak rate and buffer size) for decoding a given bitstream. Trial Tr. __.

582. The bitstream evaluation disclosed and covered by Microsoft's reference decoder patents allow compression that is both correct and resource-efficient for devices with different resource footprints. Trial Tr. __.

583. Microsoft has many patents that describe features of such signaling and using multiple sets of HRD parameters. Some patent claims generally cover encoder-side processing with multiple sets of HRD parameters, including signaling of multiple sets of HRD parameters as in the H.264 standard, and other patent claims generally cover decoder-side processing with multiple sets of HRD parameters, including parsing of multiple sets of HRD parameters from a bitstream as specified in the H.264 standard. Trial Tr. __.

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584. Microsoft's reference decoder family include patents in the U.S., Japan, China and Korea, as well as pending applications in Europe. Trial Tr. __ As of July 2012, the family includes: U.S. Patent Nos. 7,593,466, 7,646,816; Chinese Patent Nos. 02143213.9, ZL200610079930.6; German Utility Model No. 20222026.5; Japanese Patent Nos. 4199973, 4489794; Korean Patent Nos. 947162, 999311; European Patent Application Nos. 02019056.7, 06006864.0, 06022341.9 (each to be registered in European countries; at least one to be registered in Hong Kong). Trial Tr. __.

585. MPEG LA has independently evaluated Microsoft's reference decoder patents and has confirmed that they are essential to practicing the H.264 standard. PX977; Trial Tr. __.

586. Microsoft's patents cover reference decoder features that are a key feature that can be used in all profiles of the H.264 standard. Trial Tr. __.

587. Microsoft reference decoder patents provide value over the alternatives available at the time the H.264 standard was adopted. Trial Tr. __.

9. Microsoft's SEI Patents

588. Microsoft has several families of patents that relate to signaling and use of information in the "supplementary enhance information" ("SEI") messages of the H.264 standard. SEI messages are extra information that can be inserted into the H.264 encoded bitstream for various purposes. Trial Tr. __.

589. Several large families of Microsoft's SEI patents include patents that describe signaling and use of timestamp information to regulate output timing. As of July 2012, these SEI families include: U.S. Patent Nos. 7,024,097, 7,142,775, 7,167,633, 7,171,107, 7,242,437, 7,248,779, 7,633,551; Japanese Patent Nos. 4690635, 4700762; Korean Patent No. 884134; European Patent Application Nos. 01966008.3, 10014709.9 (each to be registered in European countries); U.S. Patent Application No. 11/903369. Trial Tr. __.

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590. Another patent family includes patents that describe signaling of information for a decoder to decide, for example, when to begin display of video after recovery from an interruption, e.g., after a channel change. This Microsoft SEI family includes: U.S. Patent No. 7,149,247; European Patent No. 1468566 (registered in France, Germany, Great Britain, and Italy; registered in Hong Kong); Japanese Patent No. 4503294; Indian Patent Application No. 815/DELNP/2004. Trial Tr. __.

591. Other patents in Microsoft's SEI familes describe signaling of information about regions of pictures, which a decoder can use to emphasize parts of the pictures for display. This family includes U.S. Patent Nos. 7,271,849, 7,274,407, and 7,286,189. Trial Tr. __.

592. Another Microsoft SEI family covers features of decoding that are part of the Extended profile of the H.264 standard. As of July 2012, the family includes U.S. Patent Nos. 6,912,584, 7,734,821, and 7,685,305. Trial Tr. __.

593. One Microsoft SEI patent; U.S. Patent No. 7,155,055; describes color space conversion operations that can be implemented efficiently. Trial Tr. __ Some claims of the patent cover color space conversion operations as documented in the H.264 standard for conversion between RGB and YCoCg color spaces. Trial Tr. __.

594. MPEG LA has independently evaluated Microsoft's SEI patents and has confirmed that they are essential to practicing the H.264 standard. PX977; Trial Tr. __.

595. Microsoft's patents cover SEI features that are a key feature of various profiles of the H.264 standard. Trial Tr. __.

596. Microsoft SEI patents provide value over the alternatives available at the time the H.264 standard was adopted. Trial Tr. __.

G. The Value of The Patents Motorola Claims Are Essential To The H.264 Standard

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597. The H.264 standard is a large and complex collection of technologies related to video coding technology. Many well-known techniques and technologies have been incorporated into the standard throughout its development. Trial Tr. __. In fact, the majority of the technologies available to and/or adopted by the H.264 drafters were well-known and in the public domain.

598. The drafters of the H.264 standard had a wide variety of possible technical implementations to choose from that could have been used to implement particular functionality. Trial Tr. __

599. Motorola and other companies have asserted that a number of patents are essential to the H.264 standard. Motorola's patents relate to only a small portion of the technologies in the H.264 standard. Trial Tr. __.

600. Motorola's patents had little incremental value compared to other alternatives that could have been implemented in the H.264 standard. Trial Tr. __.

601. From a technical standpoint, the Motorola patents have little if any value to Microsoft, both because the H.264 standard writers could have adopted alternatives to the Motorola patents with little impact on the performance of standard-compliant devices, and because the Motorola patents have no particular value in Microsoft's products. Trial Tr. __.

XII. THE 802.11 STANDARD AND THE PARTIES' 802.11 SEPS

A. Background on Wireless Communications

602. Radio frequencies ("RF") have been used for communications for over 100 years. RF signals are transmitted and received over the air by using antennas. Trial Tr. __.

603. Examples of common RF communications include AM and FM radio, satellite communications, broadcast television, and CB radios. Trial Tr. __.

1. Wireless Networks

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604. Wireless networking is common today in the home and the office. The most common form of wireless networking employs the 802.11 standard and uses RF. Wireless devices are commonly known as "Wi-Fi," which is a designation by the Wi-Fi Alliance certifying that the products comply with sections of the Institute of Electrical and Electronics Engineers ("IEEE") 802.11 standard that the Wi-Fi Alliance selects for inclusion in the certification process. Trial Tr. __. The IEEE does not independently certify products as complying with the 802.11 standard. Trial Tr. __.

605. Wireless networks typically include at least one fixed device such as an access point (typically connected to the Internet via a wired connection) and at least one client device such as a laptop, PDA, or wireless printer. Trial Tr. __.

606. An access point communicates with client devices via radio signals. These radio signals are transmitted over specific frequencies in order to minimize interference. Trial Tr. __.

607. At the frequencies used for wireless local area networks (LANs) today, the coverage of an access point is limited by the physical environment as well as the transmitted power. Trial Tr. __.

2. Computer Networks

608. The wired Ethernet standard, encompassed in the IEEE 802.3 collection of standards, is the most successful local area network standard in the last 30 years, at least prior to the 802.11 set of standards. Trial Tr. __; PX533

609. The wired Ethernet was developed by researchers at Xerox PARC in the mid-1970s. Wired Ethernet consists of a "bus" (wire) with multiple user stations connected to it. Trial Tr. __.

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610. The first wireless networks predate the development of the wired Ethernet standard. ALOHA was a packet radio network developed in the early 1970s, at the University of Hawaii, that provided network connections across the Hawaiian Islands. Trial Tr. __.

611. Following ALOHA, several companies developed proprietary wireless networking products. Trial Tr. __.

612. For example, Wavelan and Xircom manufactured proprietary plug in network cards and wireless receivers that plugged into Ethernet wall ports. Trial Tr. __.

613. The range and rates of these network cards were limited but were able to support a few hundred kilobits/second by a user. Because these products were proprietary, the various products did not interoperate, and required a customer to purchase all of the products from a single manufacturer. Additionally, these products were expensive and did not achieve widespread adoption. Trial Tr. __.

614. Prior wireless systems such as ALOHA and proprietary wireless products were the technological basis for wireless LANs as represented by the 802.11 suite of standards. Trial Tr. __.

615. Because of the success of 10 megabit/sec (Mbps) Ethernet, the expectations for wireless LANs were for rates in the 1 to 10 Mbps range and for ease of connectivity and access. Trial Tr. __.

616. Today, 802.11 capability is built into mobile devices from laptops to mobile phones to e-reader devices. Trial Tr. __.

617. The adoption of the 802.11 standard within consumer devices was largely driven by advances in semiconductor technology that allowed for the 802.11 functionality to be supported in a portion of the system chip, rather than on an entirely separate product. Trial Tr. __.

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618. These advances in semiconductor technology are unrelated to the patents Motorola declared essential to the 802.11 standard. Trial Tr. __.

3. Wireless Networks vs. Cellular Systems

619. 802.11 networks are not directly comparable to cellular systems. Trial Tr. __

620. 802.11 networks are designed to serve as a substitute for local area wired Ethernet networks, supporting a limited number of users in a limited geographical area, using unlicensed communication bands. Trial Tr. __ In contrast, cellular systems must support large numbers of users, provide for high mobility between network cells over large geographical areas, using licensed bands that are expensive and highly regulated. Trial Tr. __

621. Certain technologies are much more important to cellular systems than to 802.11 networks. Trial Tr. __ For example, it is much more important for a cellular system to support fast transitions for users of the system than this feature is for 802.11 networks (where this feature is optional). Trial Tr. __.

B. History of the 802.11 Standard Setting Process

622. The IEEE uses the number 802 to refer to a family of standards that relate to aspects of communication networks. Trial Tr. __.

623. 802.11 is a standard within the IEEE 802 family of standards and covers aspects of wireless networking in a local area network (LAN), and specifies the functions and services required for a device to operate within the LAN. Trial Tr. __.

624. For example, the 802.11 standard specifies how data are physically transmitted, formats for various control and data frames, functions of various service entities, and various security and authentication mechanisms (both for enterprise and personal communications). Trial Tr. __; PX386A at ¶¶5-8, 11 and 14-17

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625. The 802.11 standard began with a May 9, 1985 US Federal Communications Commission ("FCC") Report and Order authorizing the use of spread-spectrum and wideband technologies in previously restricted spectra. Trial Tr. __.

626. At the time of the FCC Report and Order, the IEEE had begun publishing standards for wired LANs, such as Ethernet (802.3) and Token Bus (802.4). Trial Tr. __.

627. The Report and Order provided an opportunity to develop wireless LANs that could provide the same bandwidth and features as wired networks. Trial Tr. __.

628. After the FCC's Report and Order, several corporations, such as IBM, NCR, and Xircom began working on various proprietary wireless networking technologies. Trial Tr. __.

629. The IEEE formed an 802.11 working group to develop a wireless networking standard. As work on the 802.11 standard progressed, many proprietary wireless networking efforts were abandoned by companies that joined the 802.11 working group. Trial Tr. __.

630. Near ubiquitous adoption and corresponding compliance with 802.11 in a myriad of products has turned 802.11 into the de facto wireless communication standard for everyday devices in ranges of roughly 10-100 feet. Trial Tr. __.

631. Other wireless communication standards (such as Bluetooth, CDMA, GSM, etc.) are more popular in other ranges and/or for higher mobility. Trial Tr. __.

1. The IEEE 802.11 Working Group

632. The IEEE describes itself as an organization dedicated to advancing technological innovation. The IEEE has more than 400,000 members in more than 160 countries. The IEEE publishes over 100 peer-reviewed journals and produces thirty percent of the world's literature in the electrical and computer science fields. PX516; PX518

633. In addition to its publishing activities, the IEEE also works to develop and promulgate various technology standards. This activity takes place under the IEEE Standards

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Association (IEEE-SA) which is part of the IEEE. The IEEE organizes various "working groups" that are made up of and run by IEEE members that help develop and codify technology standards. Trial Tr. __.

634. To date, the 802.11 working group has met over 130 times. PX519

635. Since the inception of the 802.11 effort, more than 30 different task groups have been formed to study various technologies for incorporation into the standard. Trial Tr. __

636. Task groups work on issues covering all aspects of the standard, from providing new features to enhancing existing functionality. Trial Tr. __

637. Amendments proposed by a task group are later voted on by the wider 802.11 membership. Accepted amendments are often incorporated into versions of the standard. Trial Tr. __

638. While there have been a substantial number of amendments to 802.11, the three major revisions to the standard since 1997 have been: 802.11-1999, 802.11-2007, and the most current revision, 802.11-2012 (published this year). PX521

2. Contributors to the 802.11 Standard: Companies that have participated in the 802.11 Working Group

639. Over one thousand companies have participated in the 802.11 working group, from a wide variety of disciplines and specialty areas. Trial Tr. __ ; PX1299-1429; PX1624

640. Of the companies that have participated in development of the 802.11 standard, 94 have filed Letters of Assurance with the IEEE. Trial Tr. __; PX7; PX1622; PX1621

C. The 802.11 Standard

641. The 802.11 standard has been under continuous development since 1990. Trial Tr. __

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642. The first official version of the standard was accepted by the IEEE in 1997, but subsequently there have been substantial modifications and amendments to the standard. Trial Tr. __ ; PX433

643. Over the years, the IEEE published various amendments to the standard dealing with specific technology areas. The publication name for the amendments take a similar form to the complete standard, but includes a letter designation and the amendment is often referred to simply by the letter designation. For example, in 2009, the IEEE published the 802.11n-2009 amendment. The 802.11n-2009 amendment, commercially referred to as "802.11n," dealt primarily with enhancements for high throughput. Trial Tr. __; PX494

644. It is common for a product to support a number of amendments simultaneously. Trial Tr. __; PX514

645. Historically, the IEEE has incorporated a number of these amendments into the complete standard and published a revision of the standard that is identified by the year in which the revision is adopted. There have been three such revisions to the original 1997 standard, 802.11-1999, 802.11-2007, and 802.11-2012, each incorporating a number of amendments. Trial Tr. __; PX521

646. From its original acceptance in 1997 to the most recent version, the 802.11 standard has evolved from a 466 page document to a 2793 page document. PX433; PX386A

647. Over that period of time, hundreds of additional individuals have been involved in work on the various amendments, representing dozens of additional organizations. Trial Tr. __

648. Over one thousand entities have participated in the 802.11 standard setting process. Trial Tr. __; PX1624

649. Today, there are over 450 representatives from over 150 different organizations participating in 802.11 standards development. PX515

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650. Even with the adoption of a new version of the 802.11 standard this year, work on 802.11 continues. There are currently at least seven amendments in development or under consideration for approval. PX1080

651. Additionally, two study groups continue to work on potential future amendments. PX1663

1. The 802.11-2012 Standard

652. The 802.11-2012 standard (the most recent version of the standard) is almost 2800 pages long and encompasses a vast number of features and functionalities. The features articulated in the 802.11 specification number in the hundreds (if not thousands) and cover a broad range of computing and networking topics. The table of contents for the 802.11-2012 standard alone spans 84 pages. PX386A

653. The thousands of technology areas are arranged into 17 sections (5 more than the original 12 sections in the 1997 standard). These sections provide: (1) a general description of the architecture; (2) a MAC service definition; (3) layer management information; (4) a PHY service specification; (5) frame formats; (6) a MAC sublayer functional description; (7) a MAC sublayer management entity (MLME) definition; (8) security; (9) fast basic service set transitions; (10) MLME mesh procedures; (11) FHSS PHY specification for the 2.4 GHz ISM band; (12) a DSSS PHY specification for 2.4 GHz band designated for ISM applications; (13) an IR PHY specification; (14) a high rate DSSS PHY specification; (15) an orthogonal frequency division multiplexing PHY specification; (16) an extended rate PHY specification; and (17) a high throughput PHY specification. PX386A

2. Optional Elements of the 802.11 Standard

654. All versions of the 802.11 standard have included optional elements. Trial Tr. __ PX386A

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655. Examples of optional features in 802.11 include LDPC codes, QoS facilities, 802.11 security/authentication, power management, and fast transitions. Trial Tr. __ PX386A; PX1625; PX1626; PX1627; PX1628; PX1629

D. Patents Related to the 802.11 Standard

656. There is no definitive compilation of patents essential to the 802.11 standard, nor any established process for identifying the entire universe of 802.11 standard essential patents. Trial Tr. __

657. A reasonable estimate is that hundreds if not thousands of U.S. patents are essential to the 802.11 standard. Trial Tr. __

658. The IEEE does not require that entities participating in the standard-setting process identify specific patents as essential. Instead, most companies submit a Letter of Assurance promising to offer any essential patent they have on RAND terms (a "blanket" Letter of Assurance). Atheros, Broadcom, Qualcomm, Research in Motion, and Intel are examples of companies that were technical leaders in their respective technology fields that provided "blanket" Letters of Assurance to the IEEE. Trial Tr. __; PX1262; PX1622

659. The IEEE defines an Essential Patent Claim as "any Patent Claim the use of which was necessary to create a compliant implementation of either mandatory or optional portions of the normative clauses of the [Proposed] IEEE Standard when, at the time of the [Proposed] IEEE Standard's approval, there was no commercially and technically feasible non-infringing alternative. An Essential Patent Claim does not include any Patent Claim that was essential only for Enabling Technology or any claim other than that set forth above even if contained in the same patent as the Essential Patent Claim." PX1262

660. Even though there is no requirement to identify specific patents as essential, some companies do so nonetheless. PX7

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661. Entities that contributed to the development of the 802.11 standard identified over 350 issued U.S. and foreign patents and over 30 patent applications as essential to the 802.11 standard in Letters of Assurance to the IEEE. PX7

E. Via Patents

662. The Via Licensing Corporation ("Via") licenses a pool of patents that Via has determined are 802.11 standard essential patents. Each patent is evaluated for essentiality in an independent evaluation process before being accepted into the Via pool. PX17; PX1060; PX1158; PX1623

663. The Via 802.11 patent pool includes 15 U.S. patents. PX1158; PX1623

F. Motorola's Proposals to the 802.11 Working Group

664. Motorola has participated in the 802.11 Working Group. Trial Tr. __; PX1601

665. Motorola does not generally track proposals made to the 802.11 Working Group. Trial Tr. __.

666. Motorola has not linked any of its patents to proposals made to the 802.11 Working Group. Trial Tr. __

667. Motorola has not identified any proposal to the 802.11 Working Group that was related to a Motorola patent and was ultimately accepted into the 802.11 standard. Trial Tr. __.

668. Of the documents Motorola has submitted to the 802.11 Working Group, a number are items such as meeting minutes and voting ballot summaries, and neither of these categories of documents can be considered technical contributions. Trial Tr. __; PX144

669. At most, Motorola made 210 proposals related to technology to the 802.11 Working Group, out of over 66,000 documents in the 802.11 document archives. Many of these 210 proposals include a number of joint proposals, where at least part of the proposal was authored by individuals from outside of Motorola. Trial Tr. __.

G. Alternatives to the Functionality Contained Within The 802.11 Standard

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670. The 802.11 suite of standards was built upon a long history of research and technology development in a significant number of areas of technology. Trial Tr. __.

671. In particular, each technology incorporated into the 802.11 standards arose from substantial prior research and development history outside of any 802.11 standards activity, and involved many researchers, engineers, academic institutions, government agencies, and companies that did not participate in the 802.11 standard setting process. Trial Tr. __.

672. Much of the technology on which the 802.11 standard is built was in the public domain and not patented. Trial Tr. __. For example, many of the features of 802.11, such as modulation techniques, spread spectrum, frequency hopping, collision avoidance, OFDM, error coding, channel estimation, pilot signals, etc. were developed before work on the 802.11 standard began, in the context of projects such as ALOHA and ARPANET. Trial Tr. __.

H. The Microsoft Xbox 360 Console

1. Background Xbox Information

673. The Microsoft Xbox 360 game console was launched in November 2005. PX1437 at p. 4

674. At launch, the Xbox 360 console was sold in two configurations – a "Core" configuration and a "Pro" configuration that included a 20GB hard drive. Each configuration offered network connectivity via a wired Ethernet port. Trial Tr. __.

675. The consoles, as sold, did not provide 802.11 functionality. Trial Tr. __.

676. An Xbox 360 wireless adapter was also offered for sale in November 2005; this adapter provided support for 802.11a/b/g and could be connected to the Xbox 360 console via a USB. Trial Tr. __; PX110

677. In April 2007, a third configuration of the Xbox 360 console (the "Elite") was offered for sale, offering HDMI output and a 120GB hard drive. As with the two prior configurations, the console did not provide 802.11 functionality. Trial Tr. __.

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678. In November 2009, Microsoft offered for sale a wireless adapter that provided support for 802.11a/b/g/n. Trial Tr. __.

679. The Microsoft Xbox 360 S was offered for sale in June 2010. It was the first Xbox console to feature integrated WiFi, with support for 802.11a/b/g/n. Trial Tr. __.

680. WiFi functionality in the Xbox 360 S is provided through an internal hardware component manufactured by Marvell which is connected to the Xbox motherboard via a USB connection. Trial Tr. __; PX525

681. As with earlier versions of the Xbox 360, the Xbox 360 S console also offers network connectivity via a wired Ethernet port. PX1437 at pp. 48-49

682. A wired connection is the fastest, most reliable way to connect to a network. PX1139

2. The Xbox and 802.11 Quality of Service (QoS) Facilities

[redacted]

684. [redacted]

3. The Xbox and 802.11 Power-saving Functionality

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687. In the United States, the Xbox is sold with a 110v AC adapter and this adapter is used to power the Xbox. PX1437 at p. 8, 19

688. In normal use, the Xbox is plugged into a wall outlet. The Xbox does not contain an internal battery capable of powering the Xbox, and Microsoft does not offer any battery powered modules (internal or external) for use with the Xbox. Trial Tr. __.

[redacted]

4. The Xbox and Mesh Networks

[redacted]

5. The Xbox and Ad-Hoc Networks

692. The Xbox can be configured to connect directly with other Xbox devices (without an access point) using an ad-hoc mode. The typical use of an Xbox is not in ad-hoc mode, but in infrastructure mode (wherein the Xbox is connected to an infrastructure network via an access point). Trial Tr. __.

6. Xbox Network/Internet Connectivity

693. The Xbox does not provide a general purpose web "browser" or software that allows users (or applications) to navigate to any web or IP address. Trial Tr. __.

694. The Xbox may only connect to other Xboxes, to computers in the same local area network as the Xbox (for the purposes of streaming content – such as pictures and music –

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to the Xbox) to Xbox Live servers, and to the servers of certain content providers that can be accessed through the Xbox Live service. Trial Tr. __; PX1437 at pp. 128-144

(a) Connections to other Xboxes

695. An Xbox may send and receive packets to and from another Xbox using a wired or wireless connection. Communication between Xboxes most often occurs in the context of networked, multiplayer gaming. Trial Tr. __.

(b) Connections to Xbox Live Servers

696. The Xbox can access various forms of content (including downloadable games, music, movies, etc.) via the Xbox Live service. Sensitive information sent between the Xbox Live servers and the Xbox is encrypted by the Xbox and Xbox Live servers. Information that is not encrypted is not considered sensitive. Trial Tr. __.

(c) Connections to content provider servers

697. At present, the Xbox Live service offers content from the following providers: CinemaNow, Dailymotion, MSN, YouTube, Crackle, EPIX, ESPN, Hulu, Last.fm, iHeartRadio, Netflix, Syfy, TMZ, Today Show, and UFC. PX995

698. In general, third party servers use XLSP or SSL/HTTPS to encrypt communications between the server and the Xbox. Trial Tr. __.

(d) The Xbox and LDPC Codes

[redacted]

(e) The Xbox and Network Transitions

700. In normal usage, the Xbox is stationary, connected to an AC outlet, and connected to a single network for the duration of its use. Trial Tr. __.

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701. In normal usage, an Xbox does not "roam" between access points. In cases where a user does relocate an Xbox, the standard and expected behavior will be for a user to power down the device before moving it. Trial Tr. __.

702. A user is able to switch between available networks by changing the network settings on an Xbox, but these changes do not involve the use of fast transition functionality. [redacted] Trial Tr. __.

703. [redacted]

(f) The Xbox and 802.11

704. In the terms of the 802.11 standard, the Xbox is a "station." Using the 802.11 standard, the Xbox can connect to an access point and or to another "station" in ad-hoc mode. The Xbox cannot act as an access point; in order for the Xbox to act as an access point Microsoft would need to develop additional software and install such software on the Xbox. Trial Tr. __.

(g) Xbox Security

705. Data packets sent by the Xbox to other Xboxes and Xbox Live servers (and data packets received from Xboxes and Xbox Live servers) are encrypted by the Xbox and Xbox Live servers using a proprietary Xbox encryption protocol. This encryption takes place at the session layer and occurs prior to any lower layer encryption, including any 802.11 encryption that may take place at the data link layer. PX263

706. [redacted]

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707. 802.11 encryption encrypts the entire packet (including the packet header) between the Xbox and an access point. The access point removes the 802.11 encryption to process the packet. When the packet is passed from the access point to the network/Internet, the packet is no longer is secured with 802.11 encryption. If 802.11 encryption was not removed before the packet left the access point, the receiver would not be able to read the message. Trial Tr. __.

708. The Xbox supports connecting to an infrastructure network using no 802.11 encryption (open authentication), WEP, WPA (TKIP), and WPA2 (CCMP). The Xbox supports ad-hoc connections using open authentication or WEP. Trial Tr. __.

709. When the Xbox is connected to a network using a wired Ethernet connection, no 802.11 security is used. However, the Xbox proprietary encryption is still applied to packets. Trial Tr. __.

[redacted]

I. Patents Asserted Against Microsoft's Xbox 360

713. Motorola has accused the Xbox of infringing certain patents that Motorola claims are essential to 802.11 in prior litigation. Motorola has asserted only three of the

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patents it has identified as 802.11 "essential" against the Microsoft Xbox 360 implementation of the 802.11 standard: the '571 patent, the '712 patent, and the '516 patent. Trial Tr. __; PX1607

J. Patents Asserted To Be Essential To The 802.11 Standard By Motorola

714. In its demand letter Motorola identified 53 U.S. patents as essential to the 802.11 standard. These patents were divided across 26 different patent "families." PX1

715. In its interrogatory responses, MMI and Motorola Solutions identified 3 additional patents not listed in the Motorola demand letter as essential to the 802.11 standard. PX523; PX524

716. Motorola provided an analysis of only 8 of 26 patent "families" listed in Motorola's demand letter to Microsoft, addressing 23 of the 53 U.S. patents and applications listed therein, along with the three additional patents listed in MMI's and Motorola Solution's interrogatory responses. Trial Tr. __; PX1; PX523; PX524; PX1619

717. When Motorola Inc. split into Motorola Solutions and Motorola Mobility in 2011, a number of the patents listed in the demand letter were assigned to Motorola Solutions. PX1; PX524

718. MMI has introduced no evidence that the 30 patents or applications identified in the October 2010 letter but not analyzed against the 802.11 standard are essential to the 802.11 standard or practiced by Microsoft products. Trial Tr. __.

719. Motorola identifies twenty-six U.S. Patents owned either by Motorola Mobility Inc. or Motorola Solutions, Inc. (collectively, "Motorola") as essential to the 802.11 standard. Trial Tr. __; PX1619; PX523; PX524

720. Two of the twenty-six patents expired before Motorola sent its licensing letter of October 2010 to Microsoft, three have expired since that time, and five more will expire by

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the end of 2013. Thus, only sixteen of the twenty-six patents will still be enforceable after December 2013. Trial Tr. __; PX1619

721. Seven other patents that Motorola listed as essential to 802.11 in its October 2010 letter have also expired, and Motorola has not analyzed these patents against the 802.11 standard. Trial Tr. __; PX1; PX1620

722. To the extent a Motorola patent covers a portion of the 802.11 standard, there was alternative technology that could have been adopted instead of the Motorola patent. Trial Tr. __; PX1620

723. Each of the identified twenty-six Motorola patents represents, at best, a minor improvement over previously existing technologies that could have been chosen to be included in the 802.11 standard. Trial Tr. __.

724. Although Motorola's patents can be placed in various broad technical areas that relate to the 802.11 standard, work by others that predated the Motorola patents shows that Motorola greatly inflates the scope and purported technical contribution of its patents to the 802.11 standard. Trial Tr. __.

725. From a technical standpoint, the Motorola patents discussed have little if any value to Microsoft, both because the standard writers could easily have written the 802.11 standard to avoid the Motorola patents with little impact on the performance of standard-compliant devices, and because the Motorola patents have no particular value in the Xbox product. Trial Tr. __.

726. MMI identifies only fifteen patents as being used by the Xbox: 6,331,972 (the " '972 patent'); 6,069,896 (the " '896 patent"); 5,519,730 (the " '730 patent"); 5,272,724 (the " 724 patent"); 6,473,449 (the " '449 patent"), 5,329,547 (the " '547 patent"), 5,822,359 (the " '359 patent"); 6,038,263 (the " '263 patent"); 5,467,398 (the " '398 patent"); 5,689,563 (the "

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'563 patent") ; 5,357,571 (the " '571 patent"); 5,319,712 (the " '712 patent"); 5,636,223 (the " '223 patent"); 6,404,772 (the " '772 patent"); 5,142,533 (the " '533 patent"). Trial Tr. __

727. Of the fifteen patents identified by MMI as used by the Xbox, five are never used by the Xbox, the '223 patent, the '772 patent, the '533 patent, the '263 patent, and the '712 patent. Trial Tr. __.

728. Of the remaining ten patents, five are not used in normal operations or are redundant to Xbox functionality: the '896 patent, the '972 patent, the '571 patent, the '398 patent, the '563 patent. Trial Tr. __.

729. The five remaining U.S. patents have, at best, minimal value to the Xbox console: the '730 patent, the '724 patent, the '449 patent, the '547 patent, and the '359 patent. Trial Tr. __.

730. The '449, '547, and '359 patents relate to older amendments to the 802.11 standard, the "b" and "g" amendments. While legacy devices exist that operate based on the older amendments, the mode based on the "n" amendment is the most widely implemented today; it provides significantly improved performance over the "b" and "g" modes. Because the Xbox console is compliant with the "n" mode, the patents related to the "b" and "g" amendments are of relatively little value to the Xbox product even if the "b" and "g" modes are used in certain limited scenarios. Trial Tr. __.

731. Motorola's analysis of the '730 patent and the '724 patent does not show any link between the patents and the asserted relevant portion of the 802.11 standard, and therefore there is no basis to conclude that a standard-compliant product would infringe these patents. Trial Tr. __.

K. Patents Asserted To Be Essential But Not Alleged to Be Used by the Xbox

732. Even if one accepts the essentiality of the Motorola patents, many of these patents are not used in 802.11 implementations by devices like the Microsoft Xbox,

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demonstrating that these patents cover techniques that are optional and that may not be common in real world usage scenarios. Trial Tr. __.

1. Channel Access Management/QoS

733. Motorola identifies two patents as relating to "Channel Access Management – HCF," U.S. Patent Nos. 5,636,223 and 6,404,772. PX1619. HCF functionality is a component of the Quality of Service (QoS) facilities in the 802.11 standard. Neither of these patents has ever been asserted against any Microsoft implementations of the 802.11 standard. Trial Tr. __.

734. QoS functionality is an optional part of the 802.11 standard. PX1625

735. At a high level, QoS provides facilities for prioritizing information sent over the network so that certain types of data packets are delivered before other types of packets. QoS may sometimes be useful when a device is transmitting time-sensitive data along with other data that is not time-sensitive (or is transmitting time sensitive data on a network where other devices are transmitting data that is not time sensitive. Trial Tr. __.

736. It was recognized by 1990 that different protocols were needed for delay-sensitive multimedia applications, and many other protocols were developed to handle these situations, including the Real Time Protocol (RTP), Real Time Control Protocol (RTCP), H.320 (1990), H.323 (1996), H.324 (1995), Session Initiation Protocol (SIP), and Session Description Protocol (SDP). These protocols can be implemented over a wireless connection. Trial Tr. __; PX541; PX508; PX509; PX510; PX511; PX512; PX525

737. The 802.11e QoS standard was developed after these multimedia protocols. Trial Tr. __.

738. 802.11 QoS employs "priority" classes for wireless network access. Certain types of data are given priority over other types of data. In 802.11 QoS VoIP calls, which require low latency, receive first priority, as do two-way real-time video communications.

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Video streaming, data transfers, etc., receive lower priority for access to the channel. Trial Tr. __.

739. Prioritizing packets based on packet type was well known within the art when the sections relating to QoS were being developed within the 802.11 standard. Trial Tr. __.

740. Any Motorola proposals related to the technology only cover only a small area of QoS within the 802.11 standard and had little incremental value compared to alternatives available at the time. Trial Tr. __.

(a) The Xbox Does Not Use QoS or the '223 or '772 Patents

[redacted]

(b) U.S. Patent No. 5,636,223

742. The ITC has found that the '223 patent is invalid and that products complaint with the 802.11 standard do not infringe claim 1 of the '223 patent. PX1430

743. MMI does not contend that the Xbox practices the '223 patent.

744. Motorola reads claim 1 of the '223 patent on QoS enhanced distributed channel access (EDCA) functionality in 802.11. Trial Tr. __.

745. EDCA is optional in 802.11 and can only be used with QoS-enabled access points. PX386A at § 4.3.7 (identifying QoS and non-QoS-enabled access points).

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746. EDCA is a method of providing multiple devices access to a shared channel. At a high level, the first step in this process is to have a device determine if the channel is being used. If the channel is being used, the device will wait a period of time before testing the channel again. This method of channel access is known as CSMA/CA. Trial Tr. __.

747. Channel access over a shared medium has been known since the ALOHA network in the 1960s. One carrier sensing protocol, CSMA/CD is used in the 802.3 standard also known as Ethernet, which was first published in 1985. Trial Tr. __; PX533

748. There are many variants of CSMA that have been proposed and analyzed over the past several decades. A few of these are evaluated by Kleinrock and Scholl in their 1980 paper. Trial Tr. __; PX535

749. EDCA alters the general CSMA/CA scheme by changing the amount of time a unit waits before retesting the channel based on the priority value of the data being sent (such that a higher priority value generally results in a shorter wait time). Trial Tr. __.

750. Other options, even within the 802.11 standard, exist for carrier access. The 802.11 standard provides a variety of methods for accessing the wireless medium of which EDCA is merely one. One example of carrier access in the standard is CSMA/CA, which is used by the distributed coordination function (DCF) method, which is a required (not optional, like EDCA) component of the 802.11 standard. The '223 patent does not relate to DCF because DCF does not assign any priority values. Trial Tr. __; PX386A at § 9.2.2

751. Additionally, there is another channel access method, point coordination function (PCF), where the access point coordinates channel access by polling the stations. As with DCF, PCF does not involve the assignment of priority values. Trial Tr. __; PX386A § 9.2.3

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752. Even assuming that the '223 patent is essential to the EDCA scheme disclosed in the 802.11 patent, DCF and PCF are viable alternatives that could be used in place of the techniques described in the '223 patent. Trial Tr. __.

753. The '223 patent identifies prior art on its face that provides alternatives to EDCA. For example, U.S. Patent No. 4,534,061 describes a system for controlling channel access that "provide[s] priority access to a control channel for emergency numbers." PX547 at 3:13-15. The '061 patent further states that after an unsuccessful attempt to gain access to a control channel, "[p]rovision is also made for callers who are trying to reach emergency numbers and other pre-identified high priority numbers to have immediate access to the system without waiting for previously unsuccessful callers to terminate their try-again routines." PX547 at 5:32-40; PX547 at 9:14-40

754. Another example of an alternative to the '223 patent would be a system that did not employ collision avoidance, but instead ensured that all high priority transmissions were sent/received before any lower priority packets by reserving periods of time where only high priority transmissions could be sent. Trial Tr. __.

755. The features that Motorola describes in relation to the '223 patent provided little, if any, benefit over alternatives that could have been used instead in the 802.11 standard because the alternatives would have achieved a comparable result. Trial Tr. __.

(c) U.S. Patent No. 6,404,772

756. Motorola relates claim 1 of the '772 patent to the QoS functions of an access point distributing data to remote terminals based on the presence of voice packets. Trial Tr. __.

757. Motorola has not shown that the '772 patent is essential to the 802.11 standard. Morotola's analysis does not satisfy the fourth element of claim 1 because Motorola fails to show how an access point maintains "a fair packet distribution" where "fairness is determined

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by the number of packets that have been transmitted to each remote terminal." Trial Tr. __; PX179

758. Each of the claims relates only to an access point's operations and the '772 patent does not require or claim the operations of a station. Trial Tr. __; PX179

759. Even if the '772 patent was essential to the 802.11 standard, an Xbox is a station, not an access point. Trial Tr. __The techniques disclosed in the '772 patent would offer no technical benefit to a device that is not an 802.11 access point. Trial Tr. __.

760. The claim analyzed by Motorola relates to a specific QoS usage scenario, where voice packets and data packets are sent to a particular terminal and where those voice packets are sent before (are given higher priority) than the data packets. Trial Tr. __; PX179

761. Moreover, the fourth element of claim 1 requires that QoS capabilities are used by a station and an access point as well as support for power saving techniques by the access point as well as power save stations operating on the AP's network. Trial Tr. __

762. Finally, as with the '223 patent, Motorola analyzes the '772 patent, in part, in relation to EDCA, which is optional and only used in QoS-enabled access points. Even within the 802.11 standard there are alternatives to EDCA, such as DCF, PCF, and Request to Send/Clear to Send ("RTS/CTS"). Trial Tr. __; PX386A § 9.2.2; PX386A § 9.2.3; PX386A § 9.3.2.5

763. Real-time communications over wireless existed well before the '772 patent and there were other existing techniques for transmitting time-sensitive data, such as voice data, that could have been used in the 802.11 standard instead of the technology claimed in the '772 patent. Trial Tr. __.

764. For example, the real-time transport protocol (RTP) and Real Time Control Protocol (RTCP) were developed by the Internet Engineering Task Force (IETF) and first published in 1996 as RFC 1889. PX541 The RTP/RTCP protocols are used extensively for

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end-to-end, real-time, transfer of streaming data and are one of the technical foundations of VOIP. Trial Tr. __.

765. Additionally, explicit QoS classes were implemented by the ITU ATM Forum (Asynchronous Transfer Mode—ATM), which provide for the special characteristics of traffic such as VoIP and multimedia. Trial Tr. __; PX526; PX530

766. The features of the '772 patent provided little, if any, advance over such alternatives at least because prioritizing packets for the delivery of time-sensitive data packets was a well-known technique and these alternatives could have been adopted by the drafters of the 802.11 standard. Trial Tr. __.

(d) U.S. Patent No. 5,142,533

767. Motorola identifies one patent, U.S. Patent No. 5,142,533, as essential to DCF and EDCA functionality in the 802.11 standard. PX1619. Motorola has not asserted this patent against Microsoft implementations of the 802.11 standard. Trial Tr. __.

768. To the extent that Motorola relates the '533 patent to EDCA, EDCA is optional and only used in QoS-enabled access points. Trial Tr. __.

[redacted]

770. Under Motorola's analysis, the RTS/CTS access mode must be used if the '533 is practiced. The RTS/CTS access mode is one possible mode of channel access among the many provided for in the 802.11 standard. Trial Tr. __.

[redacted]

772. CSMA in the 802.3-1985 standard is an alternative channel access method to the '533 patent. Trial Tr. __; PX544

773. The collision avoidance methods evaluated by Kleinrock and Scholl in their 1980 paper as alternatives to the '533 patent. Trial Tr. __; PX535

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774. The ALOHANET carrier access scheme is an alternative to the '533 patent. Trial Tr. __.

775. The point coordination function (PCF) is a channel access mechanism available in the 802.11 specification is another alternative to DCF, EDCA, and the '533 patent. Trial Tr. __; PX386A § 9.2.3

776. The '533 patent adds little to nothing over the functionality of alternatives the drafters of the 802.11 standard could have adopted. Trial Tr. __.

[redacted]

2. High Throughput (U.S. Patent No. **6,038,263)**

778. Motorola asserts that claim 1 of U.S. Patent No. 6,038,263 is essential to high throughput functionality in the 802.11 standard, specifically High Throughput Long Training Field (HT-LTF) sequences. PX1619. Motorola has not asserted this patent against Microsoft implementations of the 802.11 standard. Trial Tr. __.

779. In Motorola's analysis, claim 1 of the '263 patent requires the generation of orthogonal pilot channels and the transmission of the orthogonal channels on spatially separate antennas. Trial Tr. __.

780. Under MMI's analysis, Claim 1 requires the generation of pilot channels using "different orthogonal codes." Trial Tr. __.

781. In 802.11, STBC is optional and only two spatial streams must be supported to achieve high throughput. When only two spatial streams are used, 802.11n pilot channels are generated using the same code with a different sign/polarity. Trial Tr. __; PX386A at Fig. 20-4 (showing HT-mixed format required by 802.11n); PX386A at Equation 20-27 (showing P_{HTLTF} matrix); PX386A at Fig. 20-9 (showing generation of HT-DLTFs); PX386A at Table 20-12 (showing how to determine number of space time streams).

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782. Claim 1 of the '263 patent is not essential to the 802.11 standard and the Xbox does not practice this patent. Trial Tr. __.

783. There were existing alternatives to the high throughput techniques incorporated into the 802.11 standard. For example, Wittneben's 1991 and 1993 papers described using different filtering techniques to identify different base stations, an approach that can be used for multiple antennas by filtering the streams on each antenna. Trial Tr. __; PX551; PX552

784. The '263 patent provides little, if any, technical contribution to the 802.11 standard over alternatives available to the drafters of the standard. Trial Tr. __.

3. Security

(a) U.S. Patent No. 5,319,712

787. Motorola analyzes claim 6 of the '712 patent as essential to TKIP encryption. Trial Tr. __.

788. As three different courts have concluded, the '712 patent is not essential to the 802.11 standard. PX568; PX536; PX428 The Xbox does not practice the '712 patent.

789. As the '712 patent has been construed, the transmit overflows sequence number must not be transmitted along with data packet. PX568; PX536; PX428

790. Devices that comply with the relevant portions of the 802.11 standard (including the Xbox) transmit a complete sequence number, including what MMI has asserted

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is the overflow sequence number. PX428; PX536. This operation provides a direct alternative to the method claimed in the '712 patent. Trial Tr. __.

791. Even if the '712 patent applied to TKIP encryption, the 802.11 standard provides both WEP and CCMP as alternative encryption protocols, both of which use a single counter transmitted along with the packets. Trial Tr. __; PX386A §§ 11.2.2, 11.4.3 The '712 patent does not relate to the WEP and CCMP protocols, which requires two separate values to form the sequence number used to create the encryption key variable. Trial Tr. __. Motorola does not assert that the WEP or CCMP protocols infringe the '712 patent. Trial Tr. __.

792. The '712 patent is not essential to the 802.11 standard and has no value to devices using the 802.11 standard. Trial Tr. __.

L. Patents Asserted To Be Essential But Not Used In Normal Operation In 802.11 Implementations By Devices Like The Xbox Or Redundant To Xbox Features

1. Network Setup

793. Motorola has analyzed two patents as essential to network setup functionality in 802.11 – U.S. Patent Nos. 6,069,896 and 6,331,972. PX1619 Motorola has not asserted either patent against a Microsoft implementation of the 802.11 standard. Trial Tr. __.

794. The '896 and '972 patents do not relate to connections to fixed infrastructure components (such as an access point), but instead relate to communications between peer devices, such as devices on an ad-hoc or mesh network. Trial Tr. __; PX171; PX177

(a) U.S. Patent Nos. 6,069,896 and 6,331,972

795. Motorola relates claim 17 of the '896 patent to the initial association of a station to an access point. In particular, Motorola relates the claim to a station transmitting an unsolicited probe request that includes identity information. Trial Tr. __.

796. In a previous ITC proceeding, MMI asserted different claims of the '896, claims 1, 2, 3, and 12, against system used to connect wireless devices to the Xbox, and not to the

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Xbox compliance with the 802.11 standard. Trial Tr. __; PX1607. MMI asserted other patents against the Xbox compliance with the 802.11 standard. Trial Tr. __; PX1607

797. Motorola relates claim 9 of the '972 patent to the initial association of a station to an access point as well. As with the '896 patent, Motorola also identifies the '972 patent as requiring a device to send an unsolicited message including identity information. Trial Tr. __.

798. Claim 17 of the '896 patent and claim 9 of the '972 patent merely require the transmission of unsolicited messages that include identity information, which was well known in the art prior to the priority dates of the '896 patent and the '972 patent. Trial Tr. __.

799. One example of a system that transmitted unsolicited messages to associate devices was the WaveLAN system. The WaveLAN system utilized access points transmitting beacon frames to stations for initial sign-on. Trial Tr. __; PX384; PX570

800. When the 802.11 standard was being drafted, many methods existed for associating a device to a network through probe requests or beacons that would not involve the unsolicited messages required by the '896 and '972 patents. For example, the stations could only send identity information in response to a beacon frame, instead of sending unsolicited messages. Trial Tr. __.

801. The features that Motorola describes in relation to these patents provided little, if any, advance over existing alternatives because methods for associating wireless devices without requiring pre-existing knowledge of network addresses was well-known. Trial Tr. __.

(b) The Xbox Does Not Use the '896 or '972 Patent for 802.11 Functionality

802. Motorola asserted the '896 patent against the Xbox in previous litigation in the International Trade Commission, but it did not assert the '896 patent against Xbox 802.11 compliant operations. Trial Tr. __; PX1607

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803. The typical use of the Xbox is to connect the device to a router. Trial Tr. __. While the Xbox does allow for connections to another Xbox in what is called Ad-Hoc mode, Ad-Hoc mode is not typical. Trial Tr. __ Therefore, even if one assumes for purposes of argument that these patents do cover aspects of ad hoc communications as set forth in the 802.11 standard, these patents provide little to no technical benefit to Xbox operations. Trial Tr. __.

2. Security and Encryption

804. Motorola analyzes four patents as essential to security and encryption (specifically, 4-way and Group Key Handshake Authentication, CCMP Encryption, and TKIP encryption) in the 802.11 standard as implemented by the Xbox: U.S. Patent Nos. 5,357,571; 5,319,712; 5,467,398; and 5,689,563. PX1619; Trial Tr. __.

805. Security is a large and complex topic in the 802.11 standard, spanning roughly 150 pages. The Motorola patents do not represent even a small fraction of the security functionality detailed in the standard. Trial Tr. __.

806. IEEE 802.11 networks have evolved through several security approaches, including WEP, WEP2, TKIP, and CCM-AES. Trial Tr. __.

807. Security is an optional feature for an 802.11 network – the 802.11 specification provides for "Open Authentication" meaning that a network does not require any authentication for a device to associate with the network. Trial Tr. __; PX1629

808. Open Authentication is the default option for an 802.11 network. In an open authentication system, when the Access Point (AP) receives an authentication request from a user (often designated as a Station (STA)), the AP replies with a message indicating successful authentication. Trial Tr. __

809. In the earliest 802.11 networks, the only security method specified was denoted as WEP (Wired Equivalent Privacy). WEP was optional. Trial Tr. __.

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810. WEP is vulnerable to many different attacks and thus the 802.11 working group turned attention to addressing these security issues. Trial Tr. __.

811. By the time the full extent of the weaknesses in WEP security were discovered, there was a considerable installed base of existing access points that already allowed for WEP. An interim security solution – Temporal Key Integrity Protocol (TKIP) – was adopted in the 802.11i amendment. Access points that used WEP could implement TKIP without any hardware changes. Trial Tr. __.

812. TKIP was never intended to be a final solution for the deficiencies of WEP. The 802.11i amendment also introduced Counter Cipher Mode with Block Chaining Message Authentication Code Protocol (CCMP), which provided a more secure protocol than TKIP (but required new hardware). Trial Tr. __.

813. WEP and TKIP are both deprecated in the 802.11-2012 standard. The TKIP algorithm is unsuitable for the purposes of the 802.11 standard. Trial Tr. __; PX386A § 5.1.2

814. There are a number of alternatives to TKIP. For example, within the 802.11-2012 standard itself, a superior option is already available in the form of CCMP. Trial Tr. __; PX386A § 11.4.3

815. Motorola's patents have little, if any, incremental value as compared to alternatives available to the drafters of the 802.11 standard. Trial Tr. __.

(a) U.S. Patent No. 5,357,571

816. Motorola relates claim 12 of the '571 patent to the 4-way handshake used to exchange secure encryption keys. Trial Tr. __.

817. There were many known ways to exchange encryption keys and key exchange protocols have been known at least since the 1976 publication "New Directions in Cryptography," by Whitfield Diffie. Trial Tr. __; PX506 The Challenge-Handshake

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Authentication Protocol (CHAP) provides for key exchange through the use of a 3-way handshake. Trial Tr. __; PX571; PX507

818. As another example, GSM, a cellular system, included a method of authenticating devices and creating encryption keys. Trial Tr. __; PX527

819. The '571 patent provides little to no technical contribution over prior existing alternatives for exchanging security keys. Trial Tr. __.

820. The '571 patent does not read generally on 802.11 security facilities, but instead relates to specific implementations of specific security elements. Trial Tr. __.

(b) U.S. Patent Nos. 5,467,398 and 5,689,563

821. Motorola analyzes claims 1 and 22 of the '398 patent as essential to the process by which the 802.11 encryption protocols calculate a message integrity code (MIC) to include with data packets. Motorola relates claim 1 of the '563 patent to using a packet sequence number in the calculation of the MIC. Trial Tr. __.

822. The MIC is an encrypted code that is based on the plaintext data and serves to protect against forged packets. Trial Tr. __. Under Motorola's analysis, the temporal key in TKIP and CCMP is the "messaging key" required by the claims. Trial Tr. __.

823. There were many alternatives to the process of creating and using the temporal key that were available to the drafters of this portion of the 802.11 standard. Trial Tr. __. For example, a separate key could be calculated to encrypt the MIC or the MIC could be based on a value other than the MAC address of the station or a packet sequence number (such as the message data itself). Trial Tr. __.

824. The '398 and '563 patents provided little, if any, value over alternatives that could have been adopted by the drafters of the 802.11 standard. Trial Tr. __.

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[redacted]

830. [redacted]

831. Aside from compliance with the standard, the Xbox derives no independent technical benefit from the security provided by the 802.11 standard. Trial Tr. __

M. Other Patents

1. Data Modulation

832. Wireless networks are subject to interference from other wireless devices. The interference problem was exacerbated because other devices and the Industrial Scientific

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Medical (ISM) radio band also operated at the 2.4 GHz frequency band originally allocated to 802.11 and used by the widely implemented 802.11b standard. Trial Tr. __.

833. The early standard proposed three physical layer connections, infrared (IR), frequency-hopping (FH) spread spectrum, and direct sequence spread spectrum (DSSS). Trial Tr. __.

834. The FH spread spectrum and DSSS techniques were both well known from military applications, and both offered the advantages that the wireless LAN users would have minimal interference with existing users of the ISM band and that they would also be less likely to interfere with each other. Trial Tr. __.

835. When the first 802.11 standard was set in 1997, the Physical (PHY) layer data rates were between 1 and 2 Mbps, and new standards activities were initiated to improve the data rate and throughput (delivered information bit rate) by improving the PHY layer, while maintaining the basic 802.11 MAC with minimal changes. Trial Tr. __; PX433

836. 802.11a was an effort to develop a PHY layer for the dedicated band of frequencies at 5 GHz, while 802.11b was an effort to improve the PHY layer in the ISM band at 2.4 GHz. Trial Tr. __; PX431

837. The 802.11b standard extended data rates to 5.5 and 11 Mbps. PX426

838. The 802.11a amendment replaced Direct Sequence Spread Spectrum with Orthogonal Frequency Division Multiplexing (OFDM). Trial Tr. __; PX431

839. OFDM technology was a major innovation in wireless signaling. It not invented by Motorola. Trial Tr. __.

840. OFDM utilizes the allocated band by employing multiple orthogonal carriers in narrower band channels, where some of these narrow band channels may be more reliable than others. OFDM has different modulation and coding schemes for each specified data rate. Trial Tr. __.

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841. These modulation and coding schemes are used on each orthogonal subcarrier. The modulation methods include BPSK and QPSK as before, but much higher bit rates are achieved by also incorporating Quadrature Amplitude Modulation (QAM) with up to 6 bits per subcarrier, or a signal constellation that contains 64 points. By varying the modulation method and the code rate, the transmitted bit rate per subcarrier is changed. The rates that are required to be supported by the standard are 6, 12, and 24 Mbps. The narrower band channels reduce the signal processing involved in the system. Trial Tr. __.

842. The success of OFDM in 802.11a spurred the standardization of OFDM in the 2.4 GHz ISM band under the designation 802.11g with the same set of PHY layer data rates. OFDM has also been carried into the 802.11n standard. Trial Tr. __.

843. The IEEE 802.11g standard adopts much of what was learned in developing the IEEE 802.11a standard, except that 802.11g is required to support some backward compatibility modes. Trial Tr. __; PX493

844. IEEE 802.11n continues the use of OFDM and retains many of the MAC layer characteristics. Trial Tr. __; PX494

845. To the extent that Motorola contributed anything to the already well-established field of spread spectrum signaling, their contribution in the form of proposals or patents cannot amount to more than a small portion of the subject matter and had little incremental value compared to alternatives available at the time. Trial Tr. __.

(a) Data Modulation (b/g)

846. Motorola identifies three patents as related to data modulation for the "b" and "g" modes of operation, U.S. Patent Nos. 5,329,547; 6,473,449, and 5,822,359. PX 1619. Motorola has not asserted any of these patents against Microsoft implementations of the 802.11 standard. Trial Tr. __.

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847. Modern routers operate using the "802.11n" amendment specifications. Trial Tr. __.

848. The current 802.11n amendment provides much higher performance than "b" or "g" modes. While the "b" or "g" modes may be used in limited scenarios or for compatibility with older devices, these patents have minimal value going forward. Trial Tr. __.

(i) U.S. Patent No. 5,822,359

849. Motorola analyzes claim 22 of the '359 patent as essential to the process of inserting reference symbols in a stream to be transmitted using DSSS to be used in estimating a channel at the receiver. Trial Tr. __.

850. Inserting reference symbols for channel estimation at the receiver was well known prior to the '359 patent. Trial Tr. __. One alternative that could have been used by the drafters of the 802.11 standard was the proposed IS-95 standard (published on April 21, 1992) which included a pilot channel for: timing recovery for synchronization with the network; channel estimation; frequency offset correction for the mobile; pilot strength measurements for handoff decisions. Trial Tr. __; PX537; PX538; PX545

851. The '359 patent provided little, if any, advance over existing alternatives. Trial Tr. __.

(ii) U.S. Patent No. 5,329,547

852. Motorola analyzed claim 36 of the '547 as essential to the use of reference symbols for channel estimation. Trial Tr. __.

853. As with the '359 patent, the '547 patent also relates to using reference symbols for channel estimation. Trial Tr. __; PX537; PX538; PX545 And as with the '359 patent, the proposed IS-95 standard existed at the time for drafters of the 802.11 standard to choose from. Trial Tr. __; PX537; PX538; PX545. Therefore, the '547 patent provided little, if any, advance over existing alternatives available to the drafters of the 802.11 standard. Trial Tr. __.

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(iii)U.S. Patent No. 6,473,449

854. Motorola analyzes claim 1 of the '449 patent as essential to Complementary Code Keying (CCK) modulation in the 802.11 standard. Trial Tr. __. Motorola attempts to connect the Complementary Code Keying (CCK) modulation used in the 802.11 standard with the Walsh function based Hadamard sequences emphasized in the '449 patent as the orthogonal sequences.

855. Under Motorola's analysis, the '449 patent is not essential to the 802.11 standard. Trial Tr. __.

856. Khaled Fazel's 1993 IEEE UCUPC paper, describes several alternative approaches to the '449 patent. Several alternative detection procedures are presented and analyzed in this paper. Trial Tr. __; PX528

(b) Data Modulation (a/g/n)

857. Motorola identifies two patents as related to data modulation for the "a," "g," and, "n" modes of operation, U.S. Patent Nos. 5,272,724 and 5,519,730. PX1619; Trial Tr. __. Motorola has not asserted either of these patents against Microsoft implementations of the 802.11 standard. Trial Tr. __.

(i) U.S. Patent No. 5,519,730

858. Motorola analyzes claim 14 of the '730 patent as essential to one feature of OFDM functionality in 802.11 a/g networks. Trial Tr. __.

859. Motorola has not asserted that the Xbox practices the '730 patent. Trial Tr. __; PX1607

860. Motorola relates claim 14 to 802.11 a/g OFDM and asserts that PLCP preambles located in subcarrier signals satisfies the first step of this claim.

861. Motorola has not demonstrated that the '730 patent is essential to the 802.11 standard. Trial Tr. __.

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862. The ‘730 patent as analyzed by Motorola at most only relates to the use of certain reference sequences and not the benefits of ODFM technology as a whole. Trial Tr. __.

863. OFDM technology was a major innovation in wireless signaling. It not invented by Motorola, and the ‘730 patent relates to adding a small feature to OFDM technology. Trial Tr. __.

864. The 1985 paper published in the IEEE Transactions on Communications by Leonard Cimini is a direct alternative to the ‘730 patent and illustrates inserting pilot streams on subchannels for carrier offset estimation. Trial Tr. __; PX385

865. The ‘730 patent provided little, if any, advance over existing alternatives available to the drafters of the 802.11 standard. Trial Tr. __.

(ii) U.S. Patent No. 5,272,724

866. Motorola has analyzed claim 20 of the ‘724 patent as essential to one feature of OFDM in the 802.11 standard. Trial Tr. __.

867. MMI asserts that there is a PLCP preamble located in each of the 48 different signals satisfies this requirement. However, Section 18 and Annex L of the 802.11-2012 show that only one preamble is sent for all subcarriers in an OFDM symbol. This common PCLP preamble cannot be both a first and second narrowband synchronization symbol. Trial Tr. __; PX386A

868. The ‘724 patent is not essential to the 802.11 standard and the Xbox 360 (or any device that practices the 802.11 standard) does not practice this patent. Trial Tr. __.

869. OFDM technology was a major innovation in wireless signaling. It not invented by Motorola, and the ‘724 patent relates to adding a small feature to OFDM technology. Trial Tr. __.

870. The benefits provided by of OFDM are not due to the ‘724 patent. The ‘724 patent provided little, if any, advance over existing alternatives. Trial Tr. __.

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871. The 1985 paper published in the IEEE Transactions on Communications by Leonard Cimini illustrates inserting pilot streams on subchannels for carrier offset estimation and provides a direct alternative to the '724 patent. Trial Tr. __; PX385

872. Other alternatives to the symbol synchronization methods shown in the '724 patent existed in many prior communication systems. Trial Tr. __; PX531 at pp. 199-200, 265-276

873. The '724 patent provides no technical benefit in the context of the 802.11 standard that was not available through other alternatives known to the drafters of the standard. Trial Tr. __.

N. Patents Asserted To Be Essential But Not Asserted Against The Xbox

1. Security

(a) U.S. Patent No. 5,412,722

874. Motorola relates claim 1 of U.S. Patent No. 5,412,722 to the 4-way handshake used to exchange secure encryption keys. Trial Tr. __.

875. Motorola does not assert that the Xbox practices the '722 patent. Trial Tr. __.

876. There were many known ways to exchange encryption keys and key exchange protocols have been known at least since the 1976 publication "New Directions in Cryptography," by Whitfield Diffie. Trial Tr. __; PX506 The Challenge-Handshake Authentication Protocol (CHAP) provides for key exchange through the use of a 3-way handshake. Trial Tr. __; PX571; PX507

877. As another example, GSM, a cellular system, included a method of authenticating devices and creating encryption keys. Trial Tr. __; PX527

878. The '722 patents provides little to no technical contribution over prior existing alternatives for exchanging security keys. Trial Tr. __.

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879. The '722 patent does not read generally on 802.11 security facilities, but instead relates to specific implementations of specific security elements. Trial Tr. __.

[redacted]

2. Power Management

881. Motorola has analyzed the following U.S. patents as essential to 802.11 power management functionality: 5,029,183; 5,479,441; 5,560,021; and 6,236,674. PX1619. Motorola has not asserted any of these patents against a Microsoft implementation of the 802.11 standard. The '183 and '441 patents have expired. Trial Tr. __.

882. Power management functionality is an optional feature of the 802.11 standard. Trial Tr. __; PX386A; PX1626

883. The patents that Motorola claims are essential to power management in the 802.11 standard represent only a small portion of the complex area of power management in 802.11. Trial Tr. __.

884. These patents do not have much incremental value compared to other alternatives for power management available at the time power management functionality was incorporated into the 802.11 standard. Trial Tr. __.

885. Through the use of timers and/or signals, the power management facilities of the 802.11 standard allow devices to be put into different power modes whereby the transmitter or receiver may consume less power. There were pre-existing alternatives that could have been incorporated into the 802.11 standard instead of these techniques. Trial Tr. __.

886. Power management techniques have been used with mobile devices since the introduction of pagers. Trial Tr. __.

887. The earliest pagers had relatively small short-lived batteries and techniques were developed to reduce the pagers' energy use. Many of the power management methods

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that were developed revolved around the idea of putting the pagers into low power states, where either the transceiver or receiver (or both) reduced power usage. Examples of such methods included entering the low power state could be based on a timing system (when the device would know that no messages were being transmitted) or having the low power state initiated in response to an explicit instruction. Trial Tr. __.

888. Desktop machines and most peripheral devices like printers have access to AC power and therefore power management is not an issue for these devices. Trial Tr. __.

889. Power management has become more important in recent years due to the emerging capabilities of smartphones to connect to wireless access points in addition to digital cellular system cell sites. These smartphones are turned on and are on the move most of every day, and they have limited battery power. Trial Tr. __.

890. For cell phones, the classic approach to power management is similar to that of pager devices, which is to turn off the transceiver chain; that is, do not transmit and do not receive. These devices often had a sleep mode, wherein the device is not transmitting or receiving. The mobile device must wake up when there is data to receive, which is often accomplished by the mobile device informing the cell site/access point that it is going into sleep mode, and then listening periodically for a paging message or to a beacon transmitted by the access point that informs the mobile device that data is waiting. Typically, when the mobile device receives such notifications, it wakes up and sends a reply when it is ready to receive. The timing and structure of the various messages, such as the paging message or the beacon, are set in many different ways. Trial Tr. __.

(a) U.S. Patent No. 5,560,021

891. Motorola relates claim 1 of the ‘021 patent to a power save mode where a station can be in an “awake” or a “doze” power state based on time intervals when all stations

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in power saving modes will wake up. The ability to switch between power save modes is an optional feature of the 802.11 standard. Trial Tr. __.

892. The '021 patent, in Motorola's analysis, relates to a specific power saving method where a series of time periods are established and in the first portion of the time period all stations are powered up and in a second part of the time period where packet data is transmitted. Trial Tr. __.

893. Methods for conserving power by placing wireless devices in a sleep mode until a predetermined time were well known since the days of the earliest paging systems and other mobile devices such as wireless bar code readers. Trial Tr. __.

894. Even within the 802.11 standard itself, alternative power saving methods are provided. For example, in one mode the access point will wait for a transmission from a station and then "respond with the corresponding [buffered packet] immediately." Trial Tr. __; PX386A §10.2.1.1. In another mode, the access point will respond with the buffered message "at a later time." Trial Tr. __; PX386A §10.2.1.1

895. Additionally, over the years, many methods were developed to conserve battery power for mobile devices and many alternatives existed to the method used in the '021 patent. For example, instead of a time period when all user devices are in active mode, a method could allow only selected devices to be in active mode during a specified time period. Trial Tr. __.

896. Another example is, U.S. Patent No. 5,440,560, filed in March 20, 1992 and issued on August 8, 1995, entitled "Sleep Mode and Contention Resolution Within a Common Channel Medium Access Method." PX548 The '560 patent describes a method of placing stations in sleep and awake modes based on polling requests by an access point. Trial Tr. __; PX386A §10.2.1.1; PX548 at Abstract

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897. The '021 patent provided little, if any, advance over existing alternatives, because earlier methods of placing wireless devices into sleep modes to conserve power were well known and available to the drafters of the 802.11 standard. Trial Tr. __

(b) U.S. Patent No. 6,236,674

898. Motorola relates claim 43 of the '674 patent to both the Dynamic Spatial Multiplexing (SM) Power Save Mode and conventional power management in the 802.11 standard. Trial Tr. __. Both of these power management modes are optional within the 802.11 standard. PX386A § 8.4.1.22 (SM Power Save must first be enabled then there are two different types of SM Power Save modes available, dynamic and static); PX386A § 10.2 (describing conventional power management modes and noting that the decision to enter a power save mode is driven by a station, not the access point).

899. Both the Dynamic SM Power Save Mode and traditional power save mode relate to placing a station into a lower power consumption state. Trial Tr. __. As with the '021 patent, other power saving methods for wireless devices existed at the time the 802.11 standard was drafted. Trial Tr. __. And as with the '021 patent, one example of such a method is the '560 patent. Trial Tr. __; PX548. Additionally, for the Dynamic SM Power Save Mode, the 802.11 standard includes an alternative in the form of Static SM Power Save Mode. Trial Tr. __; PX386A § 8.4.1.22, 10.2.4

900. Therefore, the features Motorola describes in relation to this patent provided little, if any, advance over existing alternatives, because methods of placing wireless devices into sleep modes (or low power) to conserve power were well known and available to the drafters of the 802.11 standard. Trial Tr. __.

(c) U.S. Patent Nos. 5,129,183 and 5,479,441

901. Both the '183 and '441 patents had expired by the time of Motorola's October 2010 letter to Microsoft. Trial Tr. __.

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902. The ‘183 and ‘441 patents, as analyzed by Motorola, require a station to send an acknowledge signal, which Motorola equates to the “ACK frame” sent from an access point to a station. The 802.11 standard itself provides alternatives to this mode of operation. Trial Tr. __ For example, in one mode of operation, instead of responding to a request from a station with an acknowledgement, the access point responds with the corresponding packet immediately. Trial Tr. __; PX386A § 10.2.1.1 As with the ’021 and ‘674 patents, the ‘560 patent is an example of an alternative method for placing devices into sleep and active modes. Trial Tr. __; PX548

903. The features that Motorola describes in relation to this patent provided little, if any, advance over existing alternatives, because methods of placing wireless devices into sleep modes to conserve power were well known. Trial Tr. __.

[redacted]

3. Mesh Networking

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906. Motorola has analyzed U.S. Patent 7,197,016 as essential to mesh networking functionality in the 802.11 standard. PX1619; Trial Tr. __. Motorola has not asserted this patent against any Microsoft implementation of the 802.11 standard. Trial Tr. __ ; PX1607

907. Wireless mesh networks based on 802.11 are formed by two or more stations (STA) that wish to interact. In an 802.11 mesh network, data is transmitted between the participating stations without the use of an access point. This network configuration is called a mesh BSS. Trial Tr. __.

908. In a mesh BSS stations act as "nodes" responsible for discovering and maintaining "routes" between devices on the mesh network. Trial Tr. __.

909. The 802.11 standard covers a wide range of technologies relating to mesh networks. The '016 patent covers only a small section of the much more complex and involved sections of the 802.11 standard dealing with mesh networking. Trial Tr. __.

910. Mesh networking is a "newer portion[] of the standard that has not yet been established in the marketplace[,]" that its "value to the standard is questionable[,]" and "that the extent to which [it] will be implemented is still very speculative at best." Trial Tr. __.

(a) U.S. Patent No. 7,197,016

911. Motorola relates claim 1 of the '016 patent to a mesh "station" capable of storing information about "descendant" devices that make up a multihop communication route. Trial Tr. __.

912. Specifically, Motorola reads the '016 patent on the "proactive tree building" operations described in the 802.11 specification, whereby in response to transmitted path request messages, a device will receive and store path response messages from other stations along the route to a desired endpoint. Trial Tr. __.

913. The routing protocol disclosed in the 802.11 specification is merely one of many possible protocols that could have been adopted by the drafters of the 802.11 standard.

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Trial Tr. __ In particular, the 1978 IEEE Proceedings paper by Robert Kahn, et al. *Advances in Packet Radio Technology*, Proceedings of the IEEE, November 1978, pp. 1468-1496, describes several approaches for mobile multi-station distributed routing and control, especially on pp. 1475-1486. Trial Tr. __; PX534

914. Additionally, the Wikipedia page on ad-hoc routing protocols lists over 70 different protocols that have been proposed for building routes and distributing data within a mesh network. Trial Tr. __; PX566

915. As another example, U.S. Patent No. 5,488,608 filed on April 14, 1994 and issued on January 30, 1996 describes a system where routing decisions are stored locally at each node/device in a routing table. Trial Tr. __; PX549 at Abstract

916. Given that many methods for building routes by storing registration information for "descendant" devices were available prior to the '016 patent, there were many alternatives to the method of the '016 patent that were well known and available to the drafters of the 802.11 standard. Trial Tr. __.

917. The features that Motorola describes in relation to this patent provided little, if any, advance over existing alternatives, because methods for routing in mesh networks were well developed and widely known prior to the '016 patent. Trial Tr. __.

918. The '016 patent is of little value. Trial Tr. __.

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4. Error Control Coding/Modulation/LDPC Codes

923. Motorola identifies three patents as relating to Low Density Parity Check Codes (LDPC codes): U.S. Patent Nos. 7,143,333; 7,165,205; and 7,493,548. PX1619. Motorola has not asserted any of these patents against any Microsoft implementations of the 802.11 standard. Trial Tr. __.

924. The standard method for controlling for errors in wireless transmissions is the use of convolutional codes. In adding multiple-input/multiple-ouput capabilities the 802.11n included LDPC codes as an option for controlling for errors when transmitting data over a noisy communicational channel. Trial Tr. __.

925. LDPC codes are optional in the 802.11 standard and are not widely used. PX1627; Trial Tr. __ Even when LDPC codes are used, they are only used in High Throughput mode, which can only occur in "802.11n" mode, and not in 802.11 "a", "b", or "g" modes. Trial Tr. __; PX386A § 20

926. The Motorola patents do not cover the use of LDPC codes generally. Trial Tr. __. There are many different ways to implement LDPC codes and that the Motorola patents (to the extent they relate to LDPC codes at all) describe specific techniques related to certain LDPC code implementations. Trial Tr. __ For example, the "'333 patent provides motivations for the *particular structure* of the [parity check] matrix[,]" as does the '548 patent, while the

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'205 patent relates to the use of a shortened version of messages when constructing LDPC codes. Trial Tr. __; PX181; PX182; PX183

927. LDPC codes have been known since the early 1960's. Tanner graphs were developed in the early 1980's that allowed the structure of LDPC codes to be better understood, and in recent years, more structured parity check matrices for LDPC have been developed. Trial Tr. __.

928. LDPC codes have become more practical to implement given modern hardware, but decoding LDPC codes is far more complex than the convolutional codes required by 802.11. Trial Tr. __

929. The concept of using LDPC codes in error control coding was well-known in the art since the 1960s. Trial Tr. __.

930. Error control coding and modulation were well-known in the art when the 802.11 standard was being developed. There were a number of different techniques available to control for errors in a noisy communication channel. Any of Motorola's contributions in the form of patents or proposals to the use of error control coding had minimal incremental value compared to the alternatives available when error control coding/modulation was developed in the 802.11 specification. Trial Tr. __.

931. The 802.11 standard requires, by default, an alternative error control technique to LDPC codes - mandatory error control coding in the form of convolutional codes. Trial Tr. __; PX386A § 20.1.1

932. The convolutional codes required by the 802.11 standard are a well-accepted alternative to the error control coding approach provided by LDPC codes. Trial Tr. __.

933. The Motorola patents provide little, if any, benefit over available alternatives, such as the convolutional codes already provided for in the 802.11 standard, because LDPC

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codes are much more complex to implement and require significant processing power to implement. Trial Tr. __.

935.

936. The LDPC patents provide no technical benefit to the Xbox**.** Trial Tr. __.

5. Data Fragmentation

937. Motorola identifies one patent as relating to data fragmentation, U.S. Patent No. 5,311,516. This patent expired on May 29, 2012. Trial Tr. __.

938. Motorola has asserted the '516 patent against Microsoft, but did not do so in the ITC proceeding, and no court has ever held that Microsoft's implementation of the 802.11 standard infringes the '516 patent. Trial Tr. __.

939. Motorola relates claim 1 of the '516 patent to the fragmentation of a MAC Service Data Unit into a MAC Protocol Data Unit. Trial Tr. __.

940. Fragmentation refers to splitting a large block of data into smaller parts and reassembling those parts upon receipt. In general, fragmentation results in less efficient use of the medium because of packet header overheads and the inefficiency of the access mechanism, and therefore, fragmentation is not widely used. Trial Tr. __.

941. In modern 802.11 devices, the devices generally have a set default threshold where packets that exceed that threshold will be fragmented. Trial Tr. __.

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942. Fragmentation is covered in many different sections of the 802.11 standard, and covers a wide array of technologies and methods. Motorola's patents do not relate to more than a small portion of the fragmentation methods within the 802.11 standard, which itself covers a vast array of additional topics. Trial Tr. __.

943. The Motorola proposals and patents only have little incremental value over the alternatives available at the time. Trial Tr. __.

944. General fragmentation and defragmentation techniques were well-known and in use years before the filing of the '516 patent. To the extent that the '516 patent represents any advance over these existing alternatives, it represents at best an incremental advantage over the well-established techniques of fragmentation and reassembly. Trial Tr. __.

945. Fragmentation of larger packets into smaller packets was well-known in the art since the earliest days of packet communication systems. Just one example is the internet protocol version 4 (IPv4) published by the IETF in 1980 as RFC 760, which described procedures for fragmenting and defragmenting data packets. Trial Tr. __; PX540 ("The internet protocol implements two basic functions: addressing and fragmentation."). Thus, any advantages of general fragmentation cannot be attributed to the '516 patent. Trial Tr. __.

946. One alternative to the technique disclosed in the '516 patent that could have been adopted by the 802.11 drafters would be to indicate the number of fragments to be expected in the first fragment sent, rather than indicating that no more fragments are to be expected in the last fragment sent. Trial Tr. __.

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952. The ‘516 patents provide little to no technical contribution to the Xbox console. Trial Tr. __.

6. Fast Transitions (U.S. Patent No. 7,236,477)

953. Motorola relates claim 12 of U.S. Patent No. 7,236,477 to certain “fast transition” functionality in the 802.11 standard. PX1619 Motorola has not asserted the ’477 patent against any Microsoft implementation of the 802.11 standard. Trial Tr. __.

954. In 802.11, fast transitions refer to the ability to switch quickly between different access points on the same network while maintaining a secure connection with the network. Certain steps that are performed in the authentication process are performed before the device moves out of the range of one access point and into the range of another access point on the

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same network, thereby making the transitions between access points occur more quickly. Trial Tr. __.

955. Fast transitions are a recent addition to the 802.11 standard. Trial Tr. __. Fast transitions are part of the 802.11r amendment to the 802.11 standard, which despite being published in 2008, was only incorporated into the 802.11 standard in 2012. Trial Tr. __; PX386A at Introduction

956. Fast transitions are an optional element of the 802.11 standard, and there is no evidence that fast transitions are widely supported, nor that fast transition functionality has been widely adopted by router manufacturers. Trial Tr. __; PX386A at § 8.3.3.11 (stating that an access point must advertise support before fast transitions may be used) PX1628

957. Alternate methods for transitioning secure connections between wireless infrastructure components were available to the drafters of the 802.11 standard. Trial Tr. __.

958. For example, instead of allowing the stations to participate in the decision to re-associate with a second access point, the access points could enforce a hand-off of communications between neighboring access points. This technique has been known since the early cellular systems, where base stations have the ability to request a handoff of a cellular device. Trial Tr. __.

(a) The Xbox Does Not Use Fast Transitions or the '477 Patent

959. Motorola does not list the '477 patent among those allegedly practiced by the Xbox. Trial Tr. __.

960. The Xbox does not practice this patent. The Xbox is generally stationary when being used and, as a result, does not move between access points in normal operation, even if users may sometimes relocate their devices. In cases where a user does relocate an Xbox, the user will generally power down the device before moving it, thereby disassociating from the network and making the fast transition procedure unavailable. Trial Tr. __;

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961. [redacted]

962. Manuals for several of the most successful commercial routers do not mention support for 802.11r or fast transitions. Trial Tr. __; PX447; PX448; PX449; PX450; PX451; PX452; PX453

963. The '477 patent provides no technical benefit to the Xbox. Trial Tr. _____.

O. Microsoft Patents

[redacted]

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969. [redacted]

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[redacted]

977. [redacted]

P. Third Party Patents

978. In every area of technology in which Motorola claims to have innovated, other companies have also obtained patents and committed them to the 802.11 standard. Trial Tr. __.

1. Security

979. Nokia disclosed three U.S. patents to the 802.11 Working Group related to encryption of data in communications: 5,987,137; 6,118,775; and 7,120,422. Trial Tr. __; PX234; PX245; PX397; PX7

980. Likewise, at least three of U.S. patents in the Via license pool patents relate to security: 6,839,553 (general authentication process between a network and a mobile station); 6,347,144 (preventing copying of data streams by placing encryption information inside a header of that stream); 7,477,746 (dynamically managing a group transient key). PX1158; PX1623; PX478; PX476; PX481

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2. Power Management

981. Nokia disclosed several patent applications and patents relevant to power management essential to the 802.11 standard: the 09/613952 application (transmission power control scheme for use in an 802.11 operable system), which matured in to U.S. Patent No. 6,842,605; the 20070201467 application, which matured into U.S. Patent Number 7,751,396 (using power-save multi-polling frames to transmit information in a multi-cast transmission); the 20060285517 application, which matured into U.S. Patent Number 7,873,018 (scheduling downlink transmissions on one link, uplink transmissions on another link, and both downlink and uplink transmissions on a third link); 8,189,506 (802.11-2012 sec. 13.14 - sending IBSS beacons to identify an awake period for the stations and operating in hibernation mode in between awake periods). PX7; PX359; PX78; PX60; PX195

982. Agere Systems, Inc. identified patent application 10/368018 which became RE40032 (using doze and awake states with message synchronization). PX7; PX495

3. Collision Avoidance

983. Apple Computer identified two U.S. patents related to collision avoidance as essential to 802.11: U.S. Patent Nos. 4,689,786 (using a three-step handshake method wherein periods before attempted retransmissions are dynamically adjusted based on recent traffic history) and 4,661,902 (handshake method and the retransmission timing after an assumed collision). PX7; PX89; PX88

984. Proxim, Inc. identified at least one patent, U.S. Patent No. 5,231,634, as essential to the 802.11 standard relating to a collision avoidance scheme when there are multiple agents in the wireless system. PX7; PX129

985. Agere Systems Inc. identified at least one patent and one application that matured into a patent as essential to the 802.11 standard relating to collision avoidance: U.S. Patent No. 5,422,887 (providing equitable access using a CDMA-CD scheme) and Application

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10/092,295, which became U.S. Patent No. 6,707,867 (transmitting signals with timing information related to transmission delays). PX7; PX137; PX325

986. The Via licensing pool includes at least one patent relating to collision avoidance – U.S. Patent No. 7,643,509 (multiple access/collision avoidance protocol). PX1158; PX1623; PX486

4. Spread Spectrum

987. Spectrix Corp. identified U.S. Patent No. 5,247,380 as essential to the 802.11 standard and related to spread spectrum technology (describing an infrared two-way communication system). PX7; PX264

988. Nokia Corp. disclosed two applications and one patent related to spread spectrum technology in 802.11: 20020160769, which became U.S. Patent No. 6,675,012 (dynamic frequency selection that indicates transmission frequency and level of interference); 20030050012, which became U.S. Patent No. 6,738,599 (dynamic frequency selection in an ad-hoc network); and U.S. Patent No. 6,834,045 (a method for allocating frequencies in a WLAN operating in the 5 GHz range). PX7; PX321; PX327; PX357

5. QoS

989. Nokia Corp. sent a Letter of Assurance to the 802.11 Working Group disclosing U.S. Patent No. 7,006,472 as essential to the standard, relating to QoS and selecting the appropriate radio flow for each packet from a selection of predefined flows. PX7; PX391

990. Certain patents in the Via license pool relate to QoS, including U.S. Patent Nos. 7,616,612 (a method of guaranteeing QoS for VoIP using priority information); 6,469,993 (preparing a table of dynamic priority numbers and each terminal); 7,616,592 (communication between a mobile station and a base station having header information); and 7,653,025 (scheduling packet transmission based on a service identification related to the packet). PX1158; PX1623; PX485; PX477; PX484; PX487

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6. Error Control Coding/Modulation

991. Nokia Corp. disclosed at least two patent and one application as essential to 802.11 relating to modulation or error control coding: U.S. Patent No. 7,664,008 (a method for determining a number of available bits in an OFDM system using LDPC); 6,298,035 (estimating separate channel frequencies when using OFDM with two transmitters); and Application 2008-0109699, which became U.S. Patent No. 7,934,146 (using LDPC in the encoding of an information block). PX7; PX74; PX255; PX61

992. Cisco Systems Inc. also made contributions in the area of error control coding/modulation: Application 11/665,171, which became U.S. Patent No. 7,996,746 (expansion of the base parity matrix to accommodate larger code rates without redesigning the parity check matrix); and U.S. Patent No. 6,654,921 (receipt of signals from multiple transmission management schemes, time-division multiplexing and frequency division multiplexing). PX7; PX97; PX318

993. AT&T also identified one patent related to error control coding/modulation – U.S. Patent No. 6,430,231 (method for using two or more antennas to receive one more symbol than antennas by using time-division multiplexing in an orthogonal manner). PX7; PX260

994. Certain patents in the Via license pool patents relate to error control coding/modulation, including U.S. Patent Nos. 5,307,376 (providing higher quality transmission of a digital signal interlaced in time and infrequency), 6,925,587 (creating an Interleaver design such that the same design is near-optimal for all Interleavers within a set of sizes), and 7,526,687 (creating an Interleaver design such that the same design is near-optimal for all Interleavers within a set of sizes). PX1158; PX1623; PX131; PX479; PX482

7. Ad Hoc/Mesh Networking

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995. Apple Computer identified U.S. Patent No. 6,069,887 to the IEEE 802.11 Working Group, disclosing the use of time synchronization among end stations in an ad hoc network. PX7; PX240

996. Nokia disclosed application number 20060121883 to the IEEE 802.11 Working Group. The application became U.S. Patent No. 8,019,344, which discusses the hand-off mechanism of a mobile station going from one fixed-site station to the next, including applicable security. PX7; PX500

8. Other Technical Areas

997. Many of the patents identified in the Letters of Assurance to the 802.11 Working Group relate to different technical subject areas than the Motorola patents. Trial Tr. __.

998. For example, several of the Via patents are directed to technical areas unrelated to the Motorola patents. For example, U.S. Patent No. 6,738,559 (reissue patent, RE41,389) relates to the Generic Advertisement Service (GAS). U.S. Patent No. 7,536,193 generally relates to acknowledgement functionality. PX1158; PX1623; PX488; PX483

Q. The Value of The Patents Motorola Claims Are Essential To The 802.11 Standard

999. The 802.11 standard is a large and complex collection of technologies related to wireless technology. Many well-known techniques and technologies have been incorporated into the standard throughout its development. Trial Tr. __. In fact, the majority of the technologies available to and/or adopted by the 802.11 drafters were well-known and in the public domain.

1000. The drafters of the 802.11 standard had a wide variety of possible technical implementations to choose from that could have been used to implement particular functionality. Trial Tr. __

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1001. Motorola and other companies have asserted that a number of patents are essential to the 802.11 standard. Motorola's patents relate to only a small portion of the technologies in the 802.11 standard. And Motorola patents cover only a small portion of even a single subject area within the 802.11 standard. Trial Tr. __.

1002. Motorola's patents relate to a small subset of technologies in the 802.11 standard and had little incremental value compared to other alternatives. Those technologies are a small subset of subjects covered by the 802.11 standard. Trial Tr. __.

1003. From a technical standpoint, the Motorola patents have little if any value to Microsoft, both because the 802.11 standard writers could have adopted alternatives to the Motorola patents with little impact on the performance of standard-compliant devices, and because the Motorola patents have no particular value in the Xbox product. Trial Tr. __.

XIII. Related Litigation

A. Litigated patents in the United States

1004. Of the seventeen patents that Motorola's interrogatory responses identify as essential to H.264 (PX1291), Motorola has asserted only five in the United States against Microsoft. Motorola asserted U.S. Patent Nos. 7,162,094 and 6,980,596 in the International Trade Commission ("ITC") in *Certain Gaming and Entertainment Consoles, Related Software, and Components Therefore*, Inv. No. 337-TA-752 ("337-TA-752") as well as in a companion action filed in the Western District of Wisconsin. PX428; PX1608. Motorola asserted U.S. Patent Nos. 7,310,374; U.S. Patent No. 7,310,375; and U.S. Patent No. 7,310,376 in a portion of the instant litigation that has been stayed.

1005. Of the fifty-three patents that Motorola's interrogatory responses identify as essential to 802.11, (PX1291; PX1293), Motorola has asserted four patents in the United States against Microsoft. Motorola asserted U.S. Patent No. 5,319,712; U.S. Patent No. 5,357,571; U.S. Patent No. 5,311,516; and U.S. Patent No. 6,069,896 in an action filed in the Western

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District of Wisconsin. PX1608. In addition, Motorola asserted U.S. Patent No. 5,319,712; U.S. Patent No. 5,357,571; and U.S. Patent No. 6,069,896 in the companion ITC Investigation 337-TA-752. PX1607. Motorola did not assert U.S. Patent No. 5,311,516 in the ITC investigation. *Id.*

1006. The only instance in which a trier has determined the infringement or validity of any U.S. patent that Motorola claims is essential to either H.264 or 802.11 was an Initial Determination by an Administrative Law Judge ("ALJ") in connection with Inv. No. 337-TA-752. That Initial Determination has been referred back to the ALJ and, after his supplemental Initial Determination, is subject to review by the International Trade Commission. *See* PX1665.

B. United States International Trade Commission proceedings

1007. Motorola asserted five patents against Microsoft in the ITC: U.S. Patent Nos. 5,319,712 (" '712 patent"); 5,357,571 (" '571 patent"); 6,980,596 (" '596 patent"); 7,162,094 (" '094 patent"); and 6,069,896 (" '896 patent").

1008. [redacted].

1009. Before the ITC, however, Motorola never asserted that the '896 patent was essential to the 802.11 standard and never asserted that Xbox's 802.11 functionality infringes the '896 patent. Instead, Motorola asserted infringement of the '896 patent based on wireless connections between Xbox consoles and Xbox accessory devices that do not use 802.11. *See, generally,* PX428 at pp. 48-66.

1010. The ALJ found claim 2 of the '596 patent and claims 7, 8, and 10 of the '094 patent to be infringed. This determination was based solely on Microsoft's H.264 compliance

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testing. *See* PX428 at pp. 115-116, 172. This decision has been remanded back to the ALJ for a determination whether this conduct is legally a violation.

1011. The ALJ did not find any evidence that customers actually use the Xbox to play content of the type required to practice the asserted claims of the '596 and '094 patents, including MBAFF-encoded content or interlaced video content. PX428 at pp. 129-130, 187.) Motorola failed to identify any example of a customer using Xbox to play interlaced content. Trial Tr. __.

1012. The ALJ found that Microsoft did not infringe the asserted claims of the '712 patent. PX428 at pp. 270-274. The ALJ's conclusion was based in part on his decision to adopt Microsoft's proposed construction over Motorola's proposed construction for the claim term "transmit overflow sequence number." PX428 at pp. 270-274. Two district courts, the Western District of Wisconsin and the Northern District of Illinois, also previously considered and rejected Motorola's construction of "transmit overflow sequence number" for the '712 patent. PX428 at pp. 265-266.

1013. The ALJ found that Microsoft infringed claims 12 and 13 of the '571 patent. PX428 at p. 217. The ALJ concluded that Motorola has shown that "Microsoft's accused products directly infringe all asserted claims of the '571 patent," (PX428 at p. 217), but that finding was not based on any use of the claimed functionality by customers. Rather, the ALJ stated: "Motorola has not offered any proof that these use-case scenarios are actually 'typical' or have ever occurred. Indeed, the accused products have many uses that never involve these operations." PX428 at p. 224.

C. German proceedings

1014. In Germany, Motorola did not assert any foreign counterparts to U.S. patents that Motorola now claims are essential to 802.11. Motorola did assert two patents against Microsoft that are foreign counterparts to U.S. patents Motorola claims are essential to H.264:

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EP 0 538 667 (" '667 patent") and EP 0 615 384 (" '384 patent"). PX621. The '667 patent is a counterpart to U.S. Patent 5,235,419 to Krause, and the '384 patent is a counterpart to U.S. Patent 5,376,968 to Wu. Trial Tr. __.

1015. In Germany, courts that adjudicate infringement do not also adjudicate invalidity. Instead, parties can file separate "nullity actions" to challenge the validity of patents asserted against them. (*See* 2:10-cv-01823-JLR at Doc. No. 213.) Microsoft initiated a nullity action in which it challenged the validity of the '667 and '384 patents. *See* PX1509. However, the court in Germany required Microsoft to suspend its nullity action in order to pursue its Orange Book defense. As such, Microsoft's invalidity defenses to the '667 and '384 patents, as set forth in Microsoft's nullity action, were never heard. *See* PX1509.

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CONCLUSIONS OF LAW

1. This is a breach of contract action. *See* Dkt. No. 335, Summary Judgment Order (June 6, 2012) at 1, 21. *See also Microsoft Corp. v. Motorola, Inc.*, No. 12-35352, -- F.3d --, 2012 WL 4477215, at *1 (9th Cir. Sept. 28, 2012) ("The underlying case before the district court concerns how to interpret and enforce patent-holders' commitments to industry standard-setting organizations."); *id.* at *9 ("The district court's conclusion[] that Motorola's RAND declarations to the ITU created a contract enforceable by Microsoft as a third-party beneficiary (which Motorola concedes) . . . [was] not legally erroneous."). Washington contract law applies. Dkt. No. 335 at 15.

2. The issue being adjudicated in this bench trial is the determination of a reasonable and nondiscriminatory ("RAND") royalty for the Motorola patents essential to the 802.11 and H.264 standards. *Id.* at 7–8, 26; Dkt. No. 346, Minute Entry (June 18, 2012).

3. Because the parties agree that a RAND royalty for Motorola's patents should be offset by a RAND royalty for Microsoft's patents essential to the 802.11 and H.264 standards, the Court has also determined the RAND royalty for Microsoft's patents.

4. The determination of a RAND royalty for a patent holder's standard-essential patents subject to a RAND licensing commitment is a justiciable issue. See Dkt. No. 335, Summary Judgment Order (June 6, 2012) at 25–27. See also Microsoft , 2012 WL 4477215, at *10 ("Whatever the appropriate method of determining the RAND licensing rate, it could well be that retrospective payment at the rate ultimately determined and a determination of the future rate, not an injunction banning sales while that rate is determined, is the only remedy consistent with the contractual commitment to license users of ITU standard-essential patents."); Dkt. No. 312-1, April 11, 2012 Hearing Tr. 28:7–16; 40:13–19; *Apple, Inc. v. Motorola, Inc.*, No. 1:11–cv–08540, 2012 WL 2376664, at *11 (N.D. Ill. June 22, 2012) (describing a "proper method of computing a FRAND royalty").

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5. A RAND royalty should reflect the value of the patented technology, but not the benefit or utility of the standard as a whole. *Apple*, 2012 WL 2376664, at *11 ("The purpose of the FRAND requirements . . . is to confine the patentee's royalty demand to the value conferred by the patent itself as distinct from the additional value—the hold-up value—conferred by the patent's being designated as standard-essential.").

6. The patent holder is not entitled to be compensated for the value of complying with the standard after the standard has been widely implemented. *Microsoft*, 2012 WL 4477215, at *1 ("[S]tandards threaten to endow holders of standard-essential patents with disproportionate market power. In theory, once a standard has gained such widespread acceptance that compliance is effectively required to compete in a particular market, anyone holding a standard-essential patent could extract unreasonably high royalties from suppliers of standard-compliant products and services. This problem is a form of 'patent holdup.'"); *Apple*, 2012 WL 2376664, at *11 ("[O]nce a patent becomes essential to a standard, the patentee's bargaining power surges because a prospective licensee has no alternative to licensing the patent; he is at the patentee's mercy.").

7. A RAND royalty should account for the contributions of others to the standard such that if every contributor sought a royalty, the aggregate "stacked" royalty for all essential patents would remain reasonable.

8. Other license agreements may be relevant to determining a RAND royalty, provided:

a. The licenses are comparable and provide a sound basis for deriving a royalty for the standard-essential patents at issue. *See LaserDynamics, Inc. v. Quanta Computer, Inc.*, -- F.3d --, Nos. 2011-1440, 2011-1470, 2012 WL 3758093, at *23 (Fed. Cir. Aug. 30, 2012) ("When relying on licenses to prove a reasonable royalty, alleging a loose or vague comparability between different technologies or licenses does

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not suffice."); *ResQNet.com, Inc. v. Lansa, Inc.*, 594 F.3d 860, 872 (Fed. Cir. 2010) ("[Courts] must consider licenses that are commensurate with what the defendant has appropriated. If not, a prevailing plaintiff would be free to inflate the reasonable royalty analysis with conveniently selected licenses without an economic or other link to the technology in question."); *Lucent Techs. v. Gateway, Inc.*, 580 F.3d 1301, 1329 (Fed. Cir. 2009) (reasonable royalty verdict "cannot stand solely on evidence which amounts to little more than a recitation of royalty numbers, one of which is arguably in the ballpark of the jury's award, particularly when it is doubtful that the technology of those license agreements is in any way similar to the technology being litigated here").

b. The licenses reflect the value conferred by the patent itself as distinct from the additional or hold-up value conferred by the patent's being designated as standard-essential, *see Apple*, 2012 WL 2376664, at *11 ("The purpose of the FRAND requirements . . . is to confine the patentee's royalty demand to the value conferred by the patent itself as distinct from the additional value—the hold-up value—conferred by the patent's being designated as standard-essential."); and

c. The licenses do not result from negotiations between licensees and the patent holder where the licensees were under duress. Dkt. No. 318, Preliminary Injunction Order (May 14, 2012) at 24; *Microsoft*, 2012 WL 4477215, at *2 ("More generally, Justice Kennedy has suggested that injunctions against patent infringement 'may not serve the public interest' in cases where 'the patented invention is but a small component of the product the companies seek to produce and the threat of an injunction is employed simply for undue leverage in negotiations.'"), quoting *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 396–97 (2006) (Kennedy, J., concurring). *See* Dkt. No. 375-2 (FTC Statement) ("[T]he threat of an exclusion order may allow the holder of a RAND-encumbered SEP to realize royalty rates that reflect patent hold-up,

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rather than the value of the patent relative to alternatives"); *Apple*, 2012 WL 2376664, at *12 (citing FTC Statement). *See also LaserDynamics*, 2012 WL 3758093, at *20–21 (collecting cases and noting that "[t]he propriety of using prior settlement agreements to prove the amount of a reasonable royalty is questionable"); *Hanson v. Alpine Valley Ski Area*, 718 F.2d 1075, 1079 (Fed. Cir. 1983) ("[L]icense fees negotiated in the face of a threat of high litigation costs may be strongly influenced by a desire to avoid full litigation.") (quotation marks omitted).

9. Under Federal Circuit law developed in the context of patent damages, the entire market value rule dictates that the revenues from sales of a multi-component product, where the particular patents at issue relate only to some of the components of the product, cannot be used as a royalty base for a reasonable royalty unless the patents form the basis for customer demand for the entire multi-component product. *See LaserDynamics*, 2012 WL 3758093, at *12 ("We reaffirm that in any case involving multi-component products, patentees may not calculate damages based on sales of the entire product . . . without showing that the demand for the entire product is attributable to the patented feature."); *Lucent*, 580 F.3d at 1336. The purpose of the rule is to ensure that a patentee does not recover the value of unpatented features as part of a royalty award; rather, a royalty award must be strictly tied to the value of the invention. *USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1318 (Fed. Cir. 2011) ("The entire market value rule allows a patentee to assess damages based on the entire market value of the accused product only where the patented feature creates the 'basis for customer demand' or 'substantially create[s] the value of the component parts.'").

10. There is no basis in precedent, logic, or economic policy for not applying the entire market value rule in the context of determining a RAND royalty. If anything, the rationale for applying the entire market value rule is even more compelling in the RAND context because of the concerns underlying the RAND requirement. Therefore, the revenues

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from sales of a standard-compliant multi-component product, where the particular patents at issue relate to only some of the components of the product, should not be used as a royalty base for a RAND royalty unless the patents (not simply the standard itself) form the basis for customer demand for the entire multi-component product.

11. The factors set forth in *Georgia–Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970), were developed in the context of reasonable royalty patent damages and have been allowed by the Federal Circuit for use in that context. Care must be exercised in relying on the *Georgia-Pacific* factors to determine a RAND royalty for standard essential patents, for at least the following reasons:

a. Factors 3 ("The nature and scope of the license, as exclusive or non-exclusive; or as restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold") and 7 ("The duration of the patent and the term of the license") are resolved by the RAND commitment because RAND licenses to standard-essential patents must be non-exclusive and unrestricted in terms of duration and territory, and with respect to whom the licensee may sell its standard-compliant products. *Georgia-Pacific* factor 4 ("The licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly") is also resolved by the RAND commitment because the patent holder is obligated to license its standard-essential patents to any other party and cannot grant licenses under special conditions designed to preserve a monopoly. *See Microsoft*, 2012 WL 4477215, at *9 ("Implicit in such a sweeping promise is, at least arguably, a guarantee that the patent-holder will not take steps to keep would-be users from using the patented material, such as seeking an injunction, but will instead proffer licenses consistent with the commitment made.").

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b. *Georgia-Pacific* factor 5 ("The commercial relationship between the licensor and licensee, such as, whether they are competitors in the same territory in the same line of business; or whether they are inventor and promoter") is inconsistent with the RAND commitment, because the patent holder is obligated to license its standard-essential patents to any party on non-discriminatory terms, and cannot discriminate between licensees based on their commercial relationship to the licensor, whether they are competitors, whether they are inventor and promoter, or on any other grounds.

c. Consideration of certain other *Georgia-Pacific* factors in the standard-essential patent context may lead to the improper capture of the value of standardization, especially where the standard—as intended by the standard-setting organization—has been successful and widely adopted. These include factors 6 ("The effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales"); 8 ("The established profitability of the product made under the patent; its commercial success; and its current popularity"); 9 ("The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results"); 10 ("The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention"); 11 ("The extent to which the infringer has made use of the invention; and any evidence probative of the value of that use").

d. Certain other *Georgia-Pacific* factors, if applied in the standard-essential patent context, may lead to unreasonable, excessive royalties by focusing on the licensee's profits from selling standard-compliant products, where the standard itself is only one of a multitude of product features, and the patent holder's patents cover only a

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fraction of the standard. These include factors 12 ("The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions") and 13 ("The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer.").

e. The defined boundaries of the hypothetical negotiation contemplated by *Georgia-Pacific* factor 15 may also be inconsistent with the RAND commitment, because compensating a standard-essential patent holder by the amount a licensee "would have been willing to pay" to obtain complete access to the standard, may lead to an unreasonable aggregate royalty burden on the standard. Further, the contractual RAND licensing commitment displaces any independent threshold of minimum compensation which "would have been acceptable [to] a prudent patentee."

DATED this 4th day of October, 2012.

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CERTIFICATE OF SERVICE

I, Nathaniel C. Love, swear under penalty of perjury under the laws of the State of Washington to the following:

1. I am over the age of 21 and not a party to this action.

2. On the 4th day of October, 2012, I caused the preceding document to be served on counsel of record in the following manner:

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